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In this Issue—*Chicago Has Aircraft Show*

MOTOR AGE

Volume XXXVII
Number 3

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JANUARY 15, 1920

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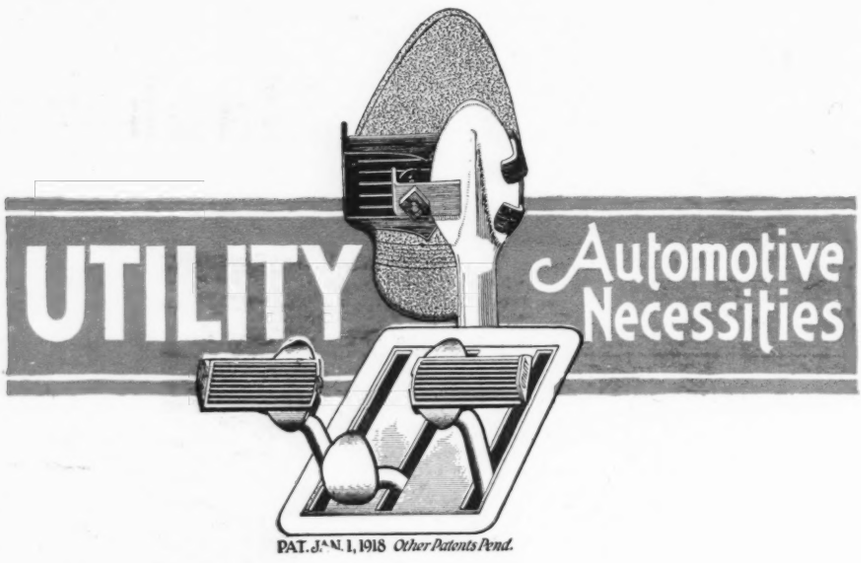

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MOTOR AGE

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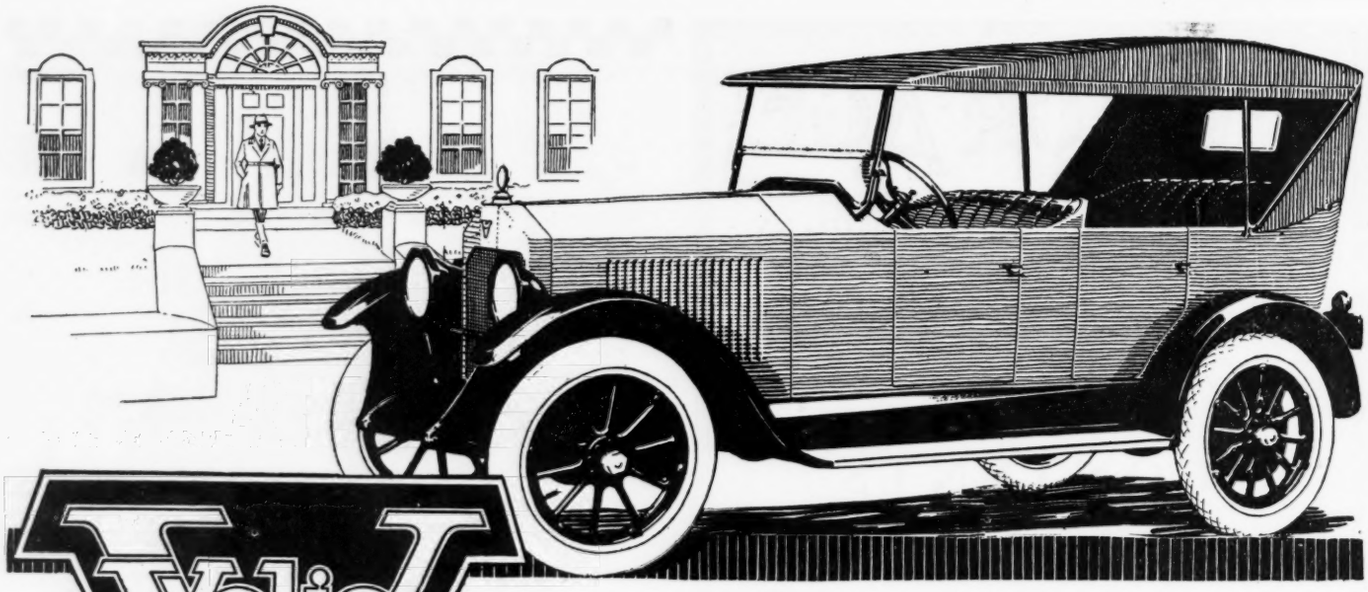

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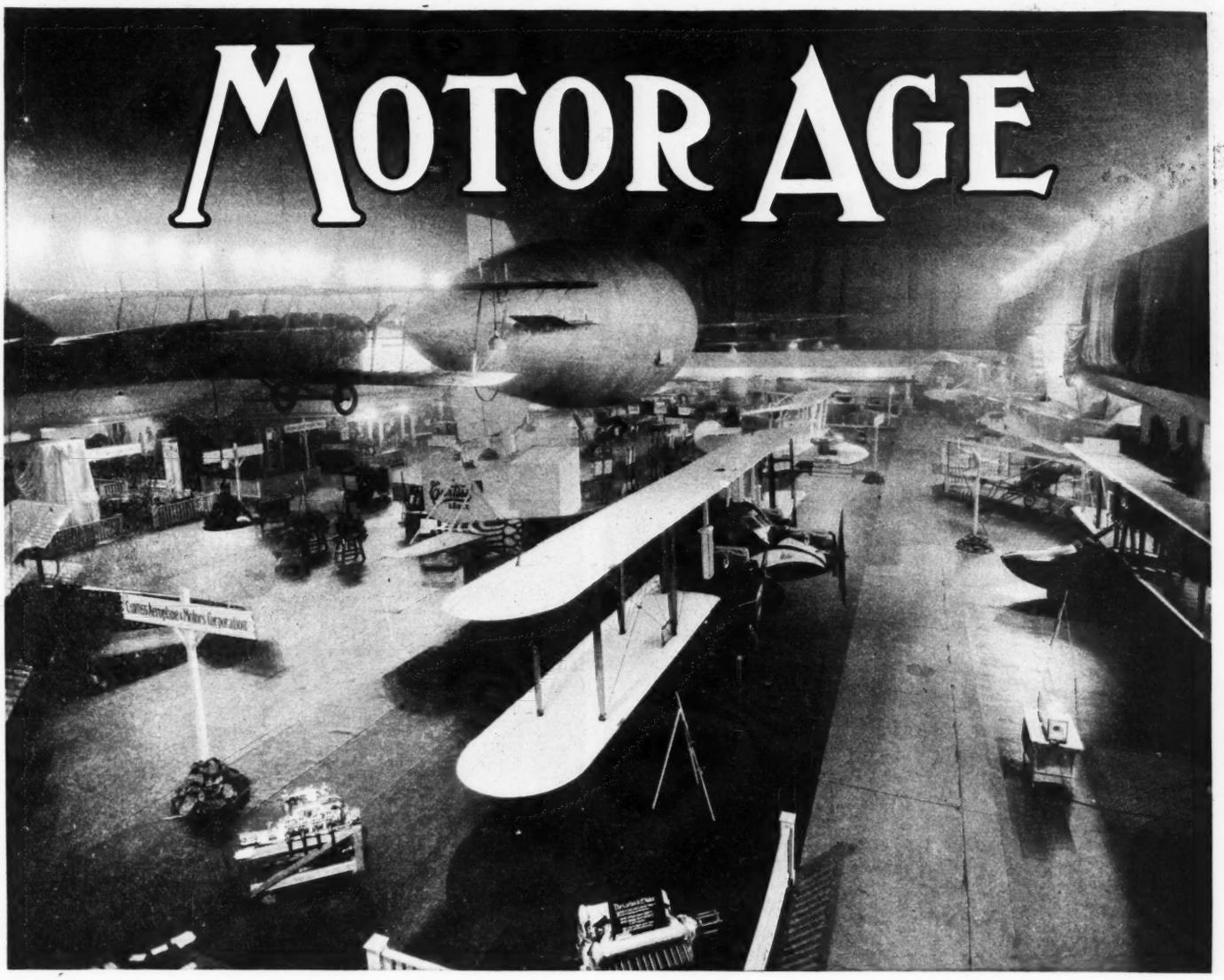


Air Show Brings Back Fond Memories to Old-Time Motor Car Men

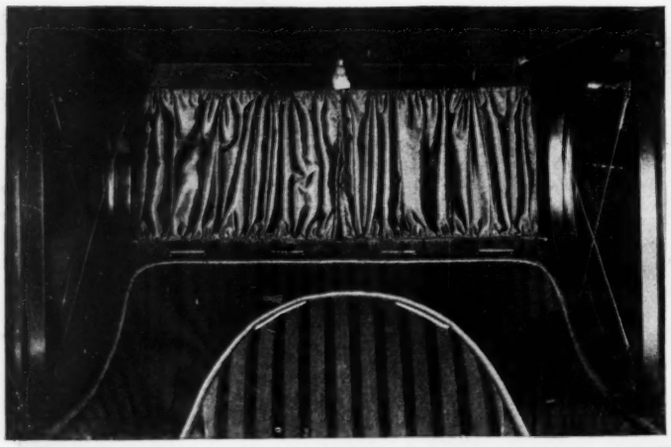
BY LAMBERT G. SULLIVAN
(Motor Age Editorial Staff)

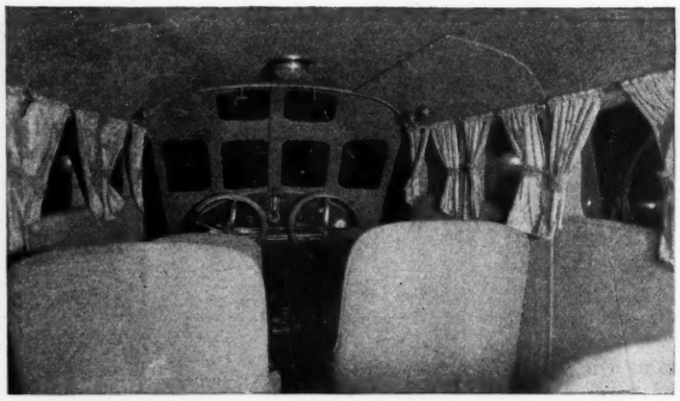
CHICAGO, Jan. 11—Turn back the pages of your life a couple of decades, recollect the first Automobile Shows which were held in New York and Chicago and you will have an excellent idea of the first Aircraft Show ever held in the middle west. Chicago had the honor of staging the exhibition this week at the Coliseum and everything was so strikingly reminiscent of the old "auto show" that one could not help being impressed. The cycle of the airplane is beginning and unless its start is sadly misinterpreted, it is due to follow the same course as that of the motor car.

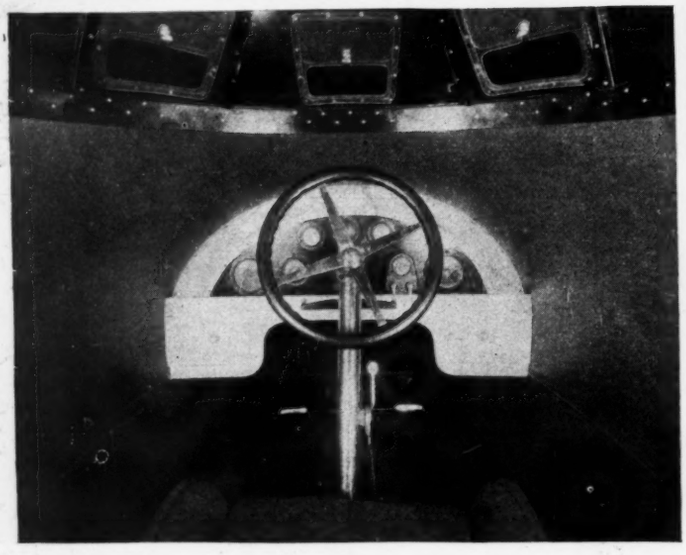
From the moment he entered the doors of the Coliseum until he left the building, that reminiscent atmosphere held the casual spectator. It was just the same sort of setting which graced the first motor car shows, the exhibits were just about in the same stage of development as the first automobile exhibits, the men in the booths in charge of the exhibits faced the same task of evangelization rather than salesmanship, and last, but not least, the public was much the same as that which attended the early motor car shows.

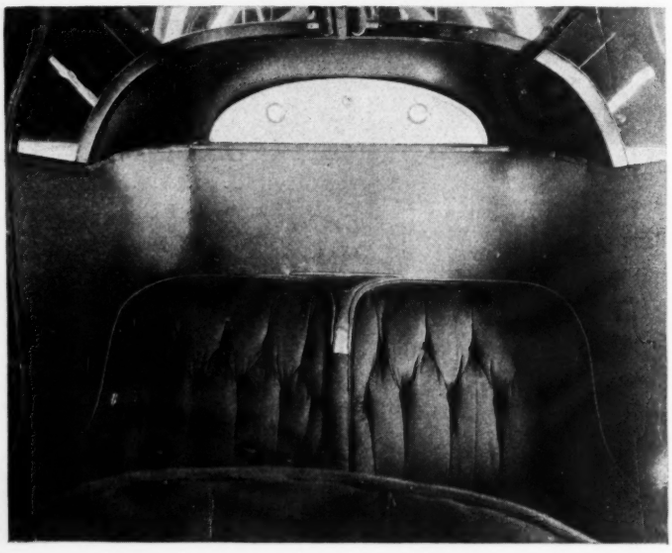
That same public was, perhaps, the most interesting part of the show to the man who is likely to be interested in the development of aircraft as a commercial proposition. The statement has been made that the attendance was strikingly similar to that at the early motor car shows. It was, but with this important difference, that its curiosity in the exhibits was tinged rather with faith than with skepticism. Those old-timers of the motor car industry remember the attitude of the "man on the street" in the early days of the industry.

His whole attitude in those days was extremely Missouri-ish. He remarked, sometimes audibly and sometimes mentally:









The group above shows some of the luxurious interior fittings of the planes shown at the Chicago Air Show; below, a general view of the show from the south balcony of the Coliseum

"Yes, these contraptions of yours are mighty pretty and mighty interesting. But will the danged things run?"

Look back in MOTOR AGE a couple of weeks ago at a photograph of the first New York Show and you will find that manufacturers felt themselves obligated to overcome this skeptical attitude by installing a track on which they could prove that the things would "run." Demonstration was the first step in sales rather than the last.

With this aircraft show crowd, however, faith has replaced skepticism. The chief difficulty of airplane manufacturers and salesmen, we venture to predict, will not be to convince their public that their products actually will fly, but to educate that same public not to expect too much. The motor car has educated the public for acceptance of the aircraft; the only danger is that it has, perhaps, overeducated it. The sublime faith of the public is likely to put a burden of too great expectation upon the manufacturer of flying craft.

Have Nucleus of a "Public"

To a great extent, the aircraft manufacturers have a big advantage over their earth-bound brethren of the motor car field in that they already have a small, select public which has been educated to the possibilities and the limitations of the aircraft. We refer, of course, to the large number of young men trained in the last three years by the United States Aviation Service and who have received a thorough rudimentary education in this line. The service men were in attendance at the Coliseum in large numbers and made up practically the whole of the "intelligent public,"—that is, part of the public which really knew what it was looking at.

On the whole, however, the attitude of the spectators seemed to be to take too much for granted. While few persons are now of the belief that they can go to the Coliseum, buy a plane and start flying it next week or the week after, the impression seems to be that within a year or two flying will be perfectly safe and sane for everyone. The rapid development of the motor car is largely responsible for this, for the public still has the impression that the modern motor car is almost an overnight development, forgetting that, even aided as it was by the possibility of big production almost from the start, it took more than a generation to produce a motor car which actually is nearly fool-proof.

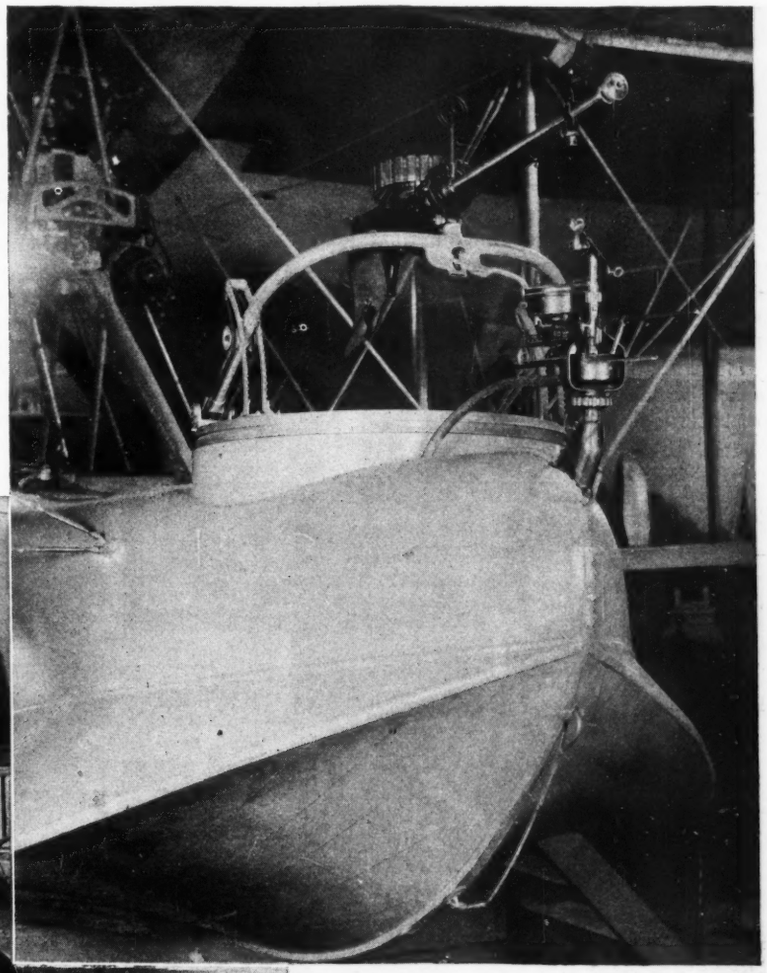
There is no question but that the aircraft is beginning on almost the same path as that which carried the motor car through so successfully. The exhibits showed that. Instead of the booths which showed the real developments of aircraft engineering drawing the crowds, the crowds were around those exhibits which had the prettiest trimmings, which were most conspicuous by reason of their size or ornateness.

And the aircraft salesman seems to be just like his older brother, the automobile salesman of a generation ago. He seems to have adopted the same flambouyant, street-carnival-barker attitude which in the motor car business has given way to more sane and sensible methods of selling. The tales we heard from some of those salesmen of how they had sold three or four planes that day and six or seven the day before sounded strangely reminiscent of the conversations of the automobile shows of 1903 and 1904.

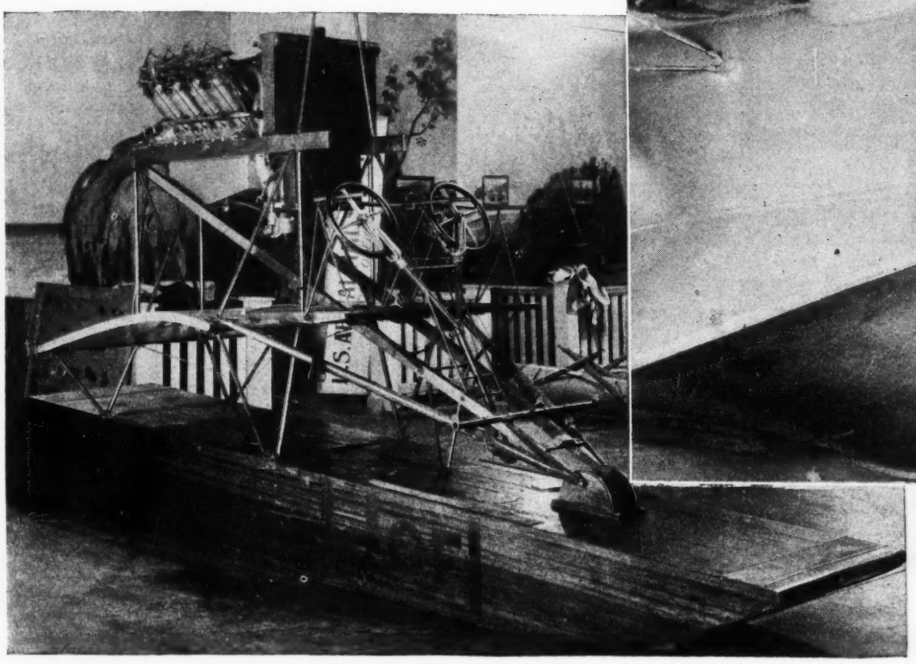
Perhaps this is only natural in a new industry but the aircraft men should take guidance from the motor car men and get over it just as soon as they conveniently can. If the aircraft is to become a commercial proposition,—and it undoubtedly eventually will,—flambouyancy is not going to speed that process to any marked extent.

The show itself is extremely simple of its staging—in fact, one's first impression on entering the building is one of bareness. The costly and ornate decorations of the great Automobile Shows are almost entirely lacking. The only special decoration of the huge show building is the installation of a sky-blue canvas dome studded with electric lights peeping through holes in the canvas which conveys the impression of even greater space than the building actually affords, to the diminuation of the exhibits.

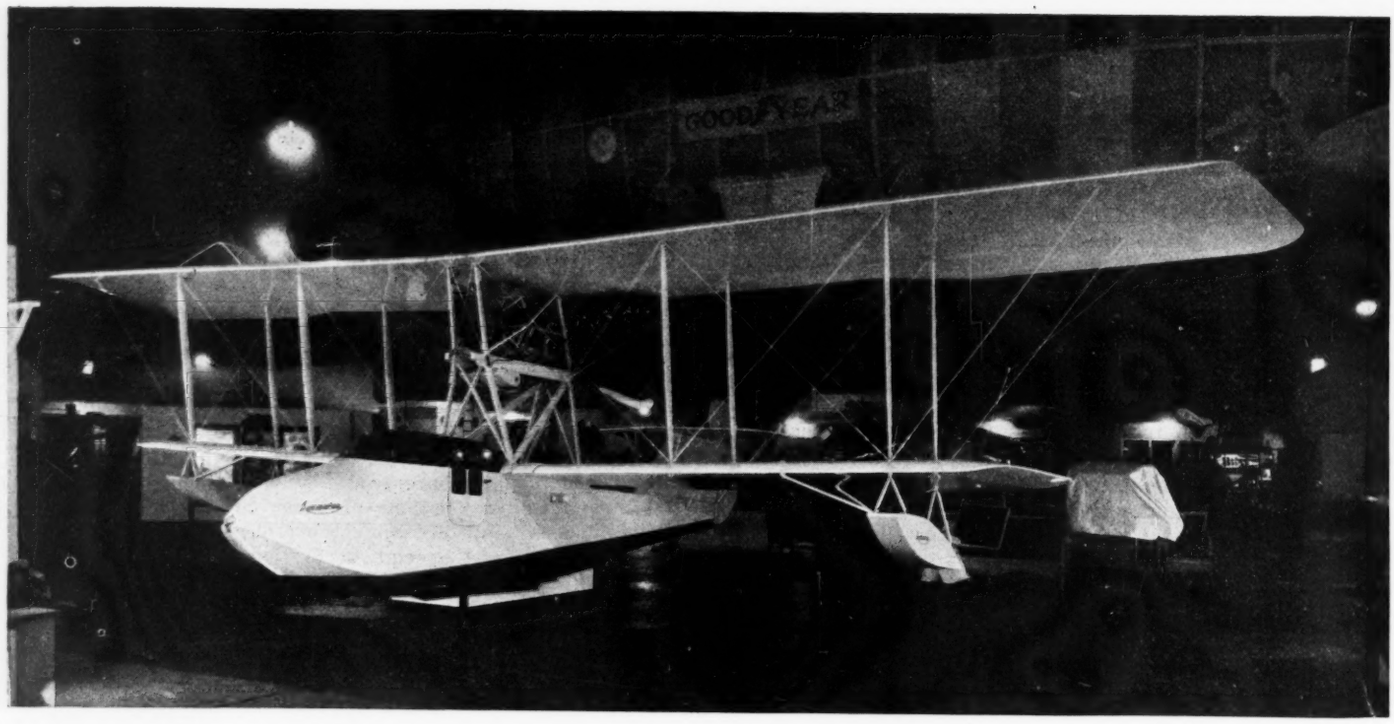
Centrally located in the building and



At the right—the latest development of the flying boat, showing the wide sheer of the hull which tends to lift the plane from the water



At the left—The U. S. Navy's earliest seaplane



The Aeromarine exhibit occupies a prominent position at the show

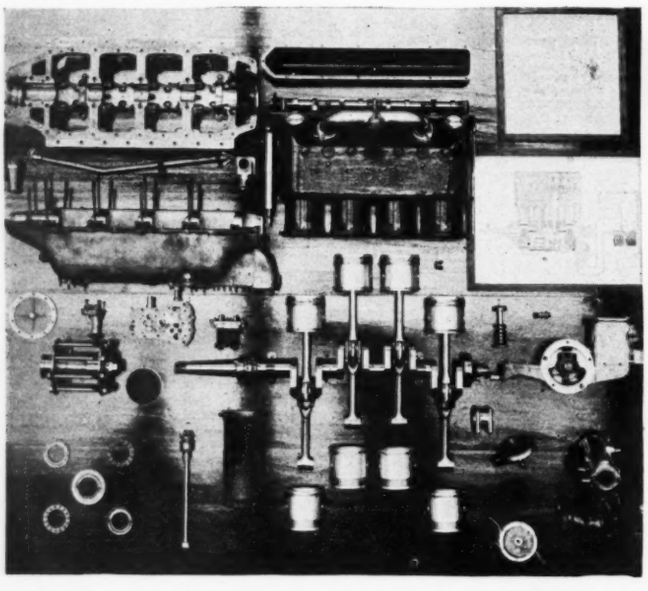
focusing first attention is a huge "blimp" exhibited by the Goodyear company. Of course, it would be impossible to show this baloon inflated with gas, but it has been filled with air and is held suspended by wires from the ceiling, carrying out the illusion of its being held up in the air by its own gas bags.

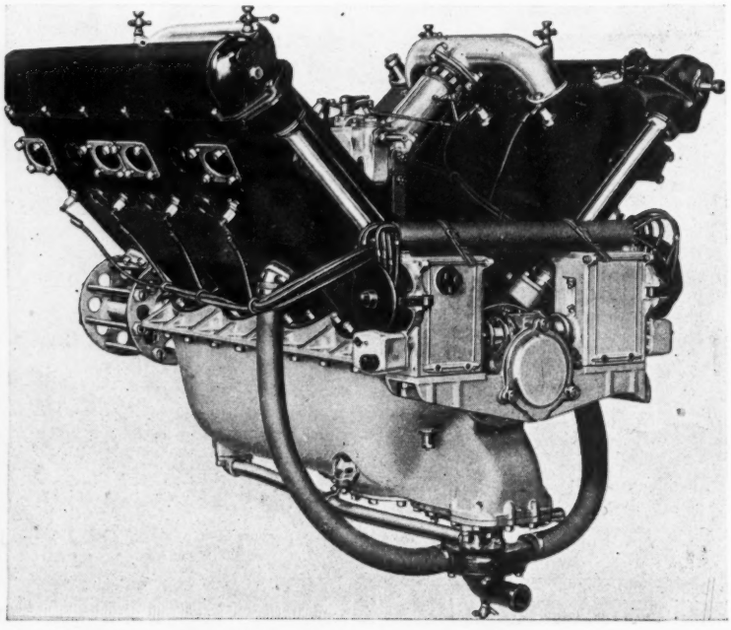
Surrounding the "blimp" exhibit and in the central part of the building are the exhibits of complete airplanes. Other completely assembled machines are grouped in this part of this building and it is these exhibits, with their wide wing spreads taking up so much space, which convey the first impression of bareness.

Little new is shown in exhibits

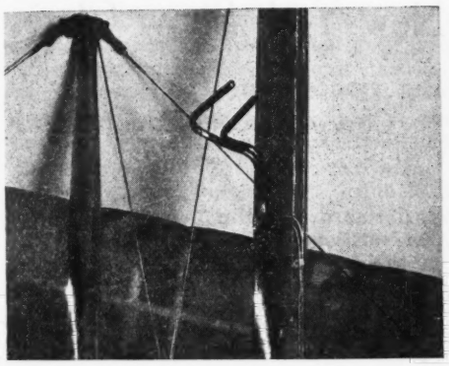
AIRPLANES whose passenger carrying capacities range from one to eight and whose wings spread over a distance of 100 ft. or more and whose engines might be a Liberty-twelve or some one else's six, are all on display at the air show at the Coliseum. From a mechanical standpoint the varieties are many and the resemblances few. A two-passenger plane of one make may be powered by a twelve-cylinder engine and someone else's by a six. The speed abilities of the two planes will be identical but for some reason there seems to be a lack of standardization.

About the only thing that the American airplane builders seemed to have reached a consensus on is the plane wing design. That is the bi-plane type. Accessibility, the keynote in motor car design, does not seem to have the same importance in the aeronautical business. Some engines are meshed in with a net work of struts and guy wires which render access impossible. But then, when the engine stops, as the airplane is a few thousand feet up in the air, it matters little whether the clogged oil pump is accessible or not. It simply becomes a problem of picking out a landing field and coming down partly alive.

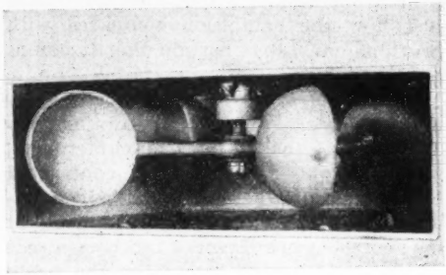




Left—300 Hp. Wright aeronautical engine. Right, 300 Hp. type H Wright-Hispano engine.



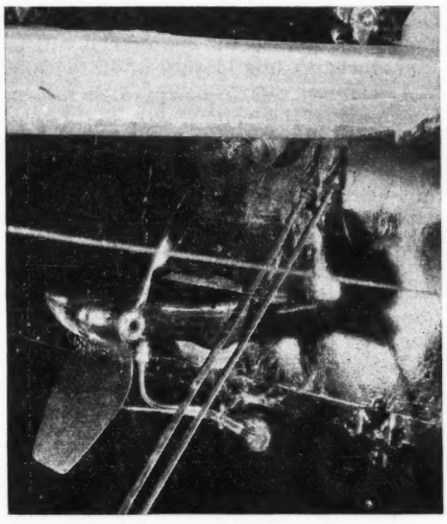
The two bent pipes on the strut form the speedometer drive on the Curtiss Eagle



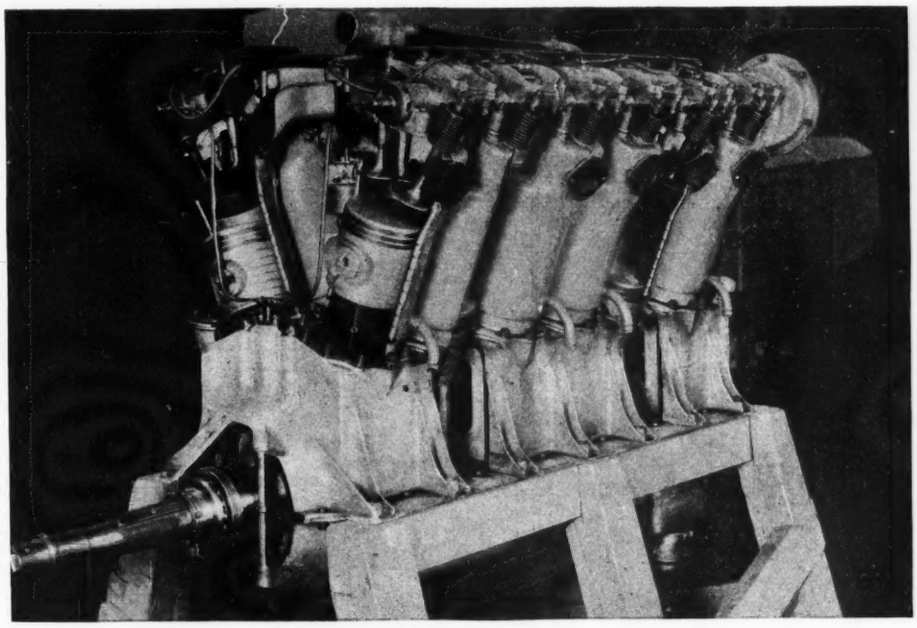
Fuel pump on Aeromarine

There are many interesting displays of contrast at the show. The Naval exhibit for example, shows a Liberty engine. Near it is an old Wright engine of six cylinders. Both are gasoline engines, but the means by which power is delivered to the propellor in each case is vastly different. The Liberty engine with its 2½-in. crankshaft delivers its power to the propellor directly through the propellor coupling. In the old Wright engine, the power is first delivered to the flywheel. From here it is applied to the propellor connection through a series of large rubber bands secured to alternate studs on the flywheel and the shaft.

Speedometers on a motor car and on an airplane bear about as much resemblance toward one another as an oil pump and a cork screw. The word



Fuel pump on Curtis Eagle



Cut-away section of Liberty aviation engine

speedometer ordinarily conveys to one's mind a picture of a handsome appearing dial, with a nickel plated case surrounding it. Contrast this with a speedometer which consists of a few pieces of pipe sticking out of the end of a wing strut. The picture shown in the group shows this speedometer. This speedometer is of the kind known as a pitometer. Its operation depends upon the action of the air that is forced against the end of the opening. This produces a pressure on the tube opening toward the front and vacuum on the tube with its opening toward the rear. This differential pressure is measured on a pressure gage on the instrument board calibrated to read in m.p.h.

Pressure feed of the fuel is almost universal on the airplanes on display. The general method is to force the fuel to the top wing section immediately above the engine from where it drains by gravity to the carbureter. A great many forms of pumps are used to force the fuel to the top wing section. On some planes propellors are used, which act just as an old fashioned windmill does. The force of the wind acting on the propellor causes it to revolve, which motion is utilized to drive a small eccentric pump. On the Aeromarine plane, an anemometer form of pump is used. The illustration shows this pump with its peculiar cup shaped blades which catch the wind and are driven back. A housing built into the body covers the blades of the fan during the return half of their revolution. On another plane, a Curtis Eagle regular propellor blades are used on the pump for the fuel pressure line.

Motor car builders are bound to learn a few things sooner or later from the airplane builder. Compound curves which are so much in vogue in motor car body construction seem to be made with little or no difficulty in the fuselage of the airplane. It should be noted that ply wood forms the basis for body and fuselage construction in the airplane.

Interiors of the airplane reveal not much more than a view within a high grade motor car interior. The instrument boards are littered with instruments of every description. Altometers, thermometers, tachometers, ammeters, voltmeters, compass, clinometers are some of the instruments in use. A good many of the airplane engines are equipped with generators so that electric light is available in the cabin interior and on the instrument board. Steering wheels are used a great deal more now on the airplane than formerly. The "Joystick," which was the principal means used for guiding the fighting craft, is abandoned in the sport type of plane for the more common steering wheel of the motor car type.

The Naval exhibit shows a new gun that bears interest because it is equipped on a seaplane. This gun was developed by the Navy department and the peculiar feature about it is that it has no recoil. This is accomplished by making two guns out of the same barrel, each barrel pointing in the opposite direction. The main barrel discharges the projectile and the secondary barrel discharges a dummy bullet made of vaseline and buckshot. The weight of this dummy bullet is exactly the same as the weight of the projectile and since both are discharged simultaneously but in opposite directions there is no recoil. This gun throws a 2½-in. projectile.

One thing that is working a change in the airplane just as it worked a change in the motor car is the increasing adoption of battery ignition over magneto ignition. Formerly it was thought that magneto ignition was an indispensable part of an airplane. Now we find that the use of battery ignition is on the increase.

Annual Dinner of the N. A. C. C.

—Photo by Drucker & Co.

New York Show Closes

Big Success in Every Way Is Concensus of Exhibitors and Dealers

Bad Feature Is the Inaccessibility of the Truck Display

NEW YORK, Jan. 10—New York's annual automobile show week closed tonight after one of the most successful exhibition periods in the history of national automobile shows. While it is too soon yet to determine exactly either from a business or attendance standpoint just how the exhibition compares with previous ones, it is certain that it has at least equaled its forerunners.

There was, if anything, a larger number of dealers and distributors in evidence and those few manufacturers, whose output had not been contracted for, closed up the most of their territories. The new cars on exhibition at the hotels were favored with a great amount of interest both from the trade and from the general public. The accessory people report a very live interest from both trade and consuming sources.

Truck Show Poorly Attended

The truck show was not nearly so well attended as was anticipated. The location of the exhibition building far north of the main part of the city meant a half-day's trip merely to go out there and back. The heating facilities were inadequate and few visitors found the show a comfortable place to pass away the time. This, however, had its value, perhaps from a business angle because those who did attend were there because they had a distinct business interest in the trucks, either as dealers, prospective dealers, or representatives of fleet owners.

The most valuable part of the truck show was the Highway Transport Conference which held daily sessions and whose discussions were of greatest importance. Some of the papers presented and discussions at the conference will be reproduced in later issues of MOTOR AGE. The conference is to be repeated in Chicago during the show there.

Many Luncheons Held

The week was unusually full of meetings and dinners and luncheons of trade and industrial bodies. A great many of the car manufacturers had either luncheons or dinners for their distributors and dealers. One of the most elaborate of these was a Studebaker dinner at the Astor; Mitchell has a lunch for its sales organization. Other concerns which had feeds for their distribution forces were the Liberty, Overland, Columbia, Maxwell-Chalmers, Saxon, Paige, and others.

Industrial gatherings included the meeting and dinner of the service men

under the auspices of the Automotive Service Men's Association of New York and Newark which is reported at length in this issue, the Rubber Men's Association of America, National Automobile Chamber of Commerce, The Motor & Accessory Manufacturers Association, and the Society of Automotive Engineers.

The National Automobile Chamber of Commerce held its annual banquet in the ball room of the Hotel Commodore with about 800 manufacturers and their guests. Following an address by George M. Graham of the Pierce-Arrow Motor Car Co., a company of New York men in the industry put on an amusing sketch built around the Court of old King Cole whose reproduction hangs in the much remembered bar room of the Knickerbocker Hotel. The twelfth annual banquet of the M. A. M. A. followed the precedent of a number of years and was devoid of speeches.

Co-operation between manufacturers and dealers to eclipse past records of the industry was pledged by the M. & A. M. at its annual session. The members realize that the quantity and quality of the 1920 automobile production depends to a large extent upon their efforts and co-operation with the dealer. Most of the officers were re-elected. C. E. Thompson, president of the Steel Products Co., was re-elected president of the association.

The Standard Parts Co. initiated this week an organization which may become a social factor of succeeding shows. This is an "Old Timers' Club" to which anyone is eligible who has been in the industry for five years. Buttons provided with a star for each five years in the industry are worn by the members.

GARFORD CAPITAL STOCK IS DOUBLED

New York, Jan. 9—President E. A. Williams, Jr., of the Garford Motor Truck Co., with factories at Lima, Ohio, today announced that the capital stock of the company had been increased from $5,000,000 to $10,000,000 to provide for an extensive program of expansion. This expansion is necessary, Mr. Williams said, to meet the increased demands for the Garford product. It will provide for an increase in production which, within the next year, will be greater by 100 per cent than the present program.

While the detailed plans for expansion are not as yet complete, it was stated that one of the company's first moves will be to erect a modern addition to its factory, 400 by 100 ft. This building will be devoted entirely to the progressive assembly of Garford motor trucks. By the installation of the latest type of machinery and the adaptation of special assembly methods, the Garford, not only intends to maintain its present high standards of manufacture, but will materially increase its output and at the same time keep the cost of production down.

To provide for still further expansion, the company has purchased additional property adjoining its factories at Lima, Ohio. This additional acreage will be utilized in the near future.

Engineers Discuss Fuel

Aluminum Pistons, Engine Design, Spring Suspension Are Other Topics

Col. J. G. Vincent Is Elected President for 1920

NEW YORK, Jan. 9—The fuel problem in automotive equipment and particularly its relation to the future design of passenger car, truck and tractor engines occupied a large proportion of the three-day annual winter session, of the Society of Automotive Engineers which closed here last night. The meeting concluded with the annual banquet which was attended by 1500 members and guests.

The meeting was characterized by important professional papers on engine design, aluminum pistons and an automotive steam system, automobile body design, and spring suspension. The fuel situation was discussed from both the designers' and refiners' standpoints, the papers being "Adapting Engines to Use of Available Fuels," by J. G. Vincent; "Dilution of Engine Lubricant," by G. A. Kramer, and a symposium on hydrocarbon fuels by a dozen engineers. Among them was C. F. Kettering, president of the Delco company; H. L. Horning, of the Waukeshau Engine Co., and Doctor H. C. Dickenson of the U. S. Bureau of Standards.

A portion of the fuel session was devoted to the cause of preignition knocks and some very interesting suggestions were made as to methods of preventing such knocks. It developed that there was little to be done in this line except by the designer of the engine, or the refiner of the fuel.

Col. J. G. Vincent was elected president to succeed H. M. Manley, of the Curtiss company. Col. Vincent is vice-president of engineering of the Packard Motor Car Co. and distinguished himself during the war by his important work in connection with the design of the Liberty airplane engine. J. G. Utz of the Standard Parts Co. is first vice-president.

The question of the next summer meeting was not discussed, but it was understood that there is a considerable proportion of members in favor of a return to Ottawa Beach, the scene of the very successful convention of 1919.

ST. LOUIS SETS SHOW DATES

St. Louis, January 12—The dates for the St. Louis Automobile Show have been definitely fixed for Feb. 16 to 21. It will be held either in the new building of the Weber Implement and Auto Co., which is nearing completion, or in the old Southern Hotel. The show committee, Joseph A. Schlecht of the Mound City Auto Co., chairman; G. D. Donnelly of the Supreme Motor Car Co.; L. H. Amrine of the Scudder Motor Truck Co., and Robert E. Lee, secretary, will be sent to Chicago and Kansas City to get ideas for the St. Louis event.

F. C. Rudisell has resigned as manager of the St. Louis branch of the Firestone Tire & Rubber Co., to become general manager of the Overland Tire and Rubber Co. of Omaha, Neb. Rudisell came to St. Louis from Omaha, where he was connected with the Firestone branch for eight years.

BUILDS CAR FOR $22.50

Buffalo, Jan. 10—Fred Wright of Buffalo claims to have just completed the cheapest automobile ever built. Buying damaged and discarded parts from junk shops, Mr. Wright completed the chassis of his car at a total cost of $22.50. He is now completing the body of the machine and believes its total cost will be considerably less than $50.

The largest single item of expense was $5.00, paid for a set of discarded tires and inner tubes. Broken and damaged parts were repaired by Mr. Wright, who has for twenty years been engaged in marine, automobile and aviation engine engineering. He is at present a foreman in the employ of the Curtiss Airplane and Motors Corp.

In its tryout the machine, which according to the builder is "mostly Ford," attained a speed of 48 miles an hour.

TAKING A WELL EARNED REST

Old Avery No. 1 is taking a rest at the factory at Peoria and all it has to do is to withstand the gaze and remarks of admiring observers.

Avery No. 1, the first gas tractor the Avery company ever built, is a 20-35. It was bought by Frank Gerry, St. Charles, Minn., and has been in almost continuous use ever since. Gerry says he has used it "for practically every kind of work for which a tractor can be used."

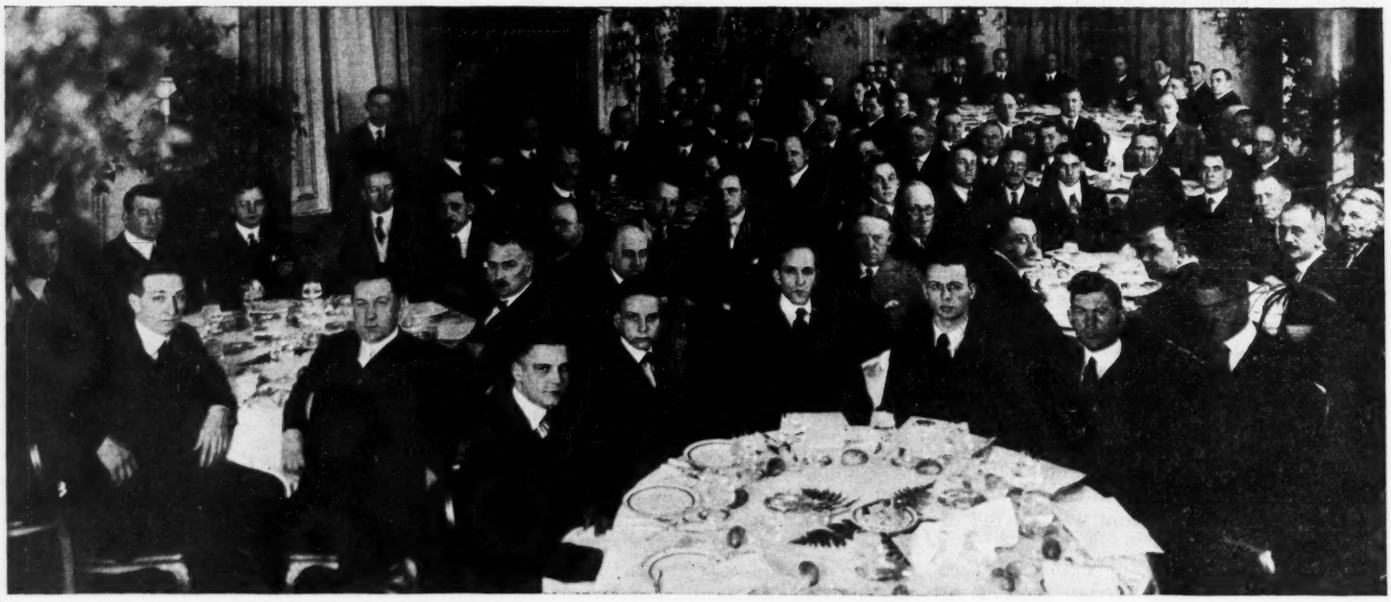
Recently Gerry decided his old machine deserved a rest after its long years of service, so he bought another Avery. The old original Avery No. 1 was shipped to the factory and now is occupying a place of honor where officials of the company can take visitors to the factory out to see and admire it.

MICHELIN HAS CORD TIRE

Paris, Dec. 22—Michelin has just placed on the market a cord construction tire. This is being built with clincher bead and in two sizes only for the present: 880 and 820 mm. diameter. The tire will be sold at 35 per cent increase on the fabric construction. This is the first cord tire to be produced in France.

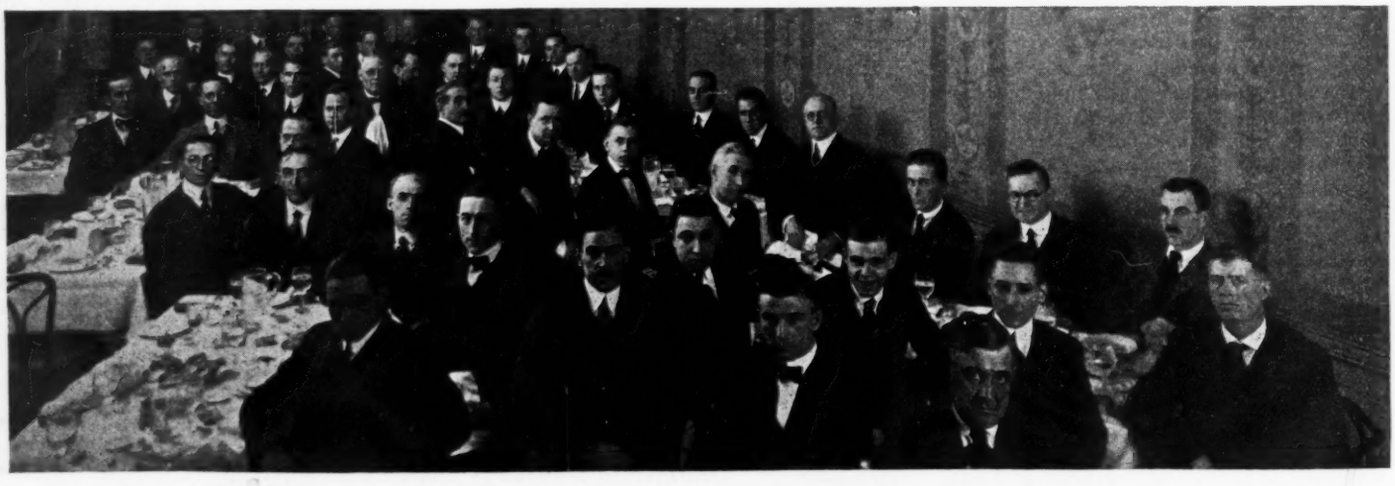
WE ACKNOWLEDGE THE ERROR

In the Dec. 18 MOTOR AGE published an item regarding the expansion of the Herschell Miller Co. The item referred to the Herschell Spillman Co. of Tonawanda, N. Y.

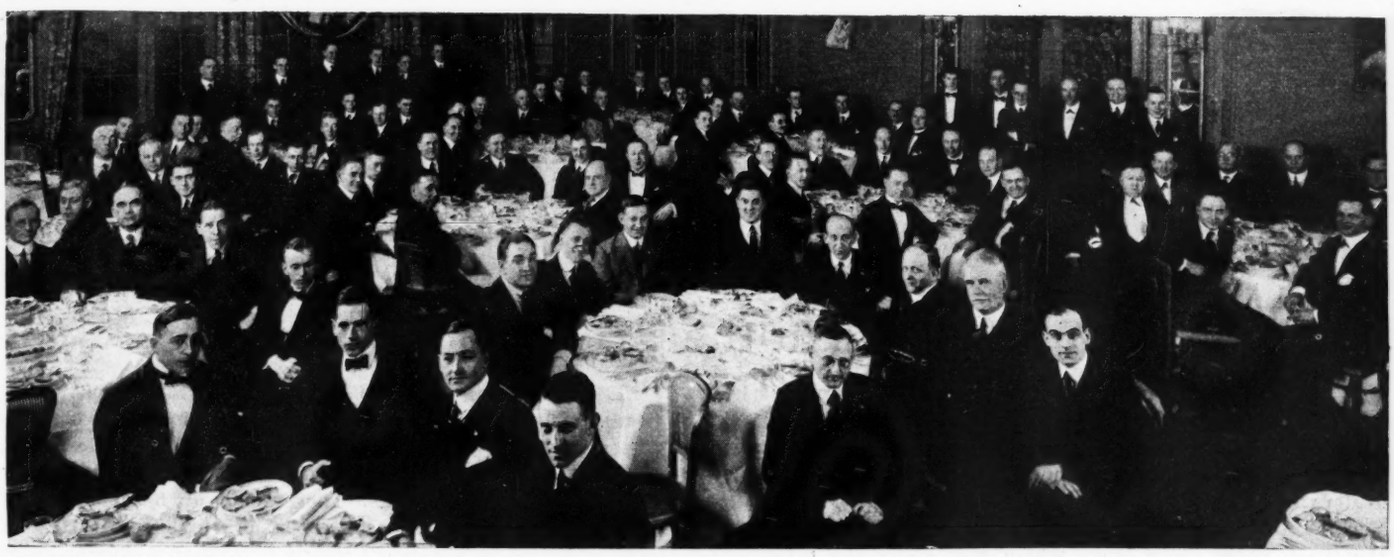


Liberty dealers showed their belief that 1920 is going to be a big year

The Velie men gathered for their annual feast

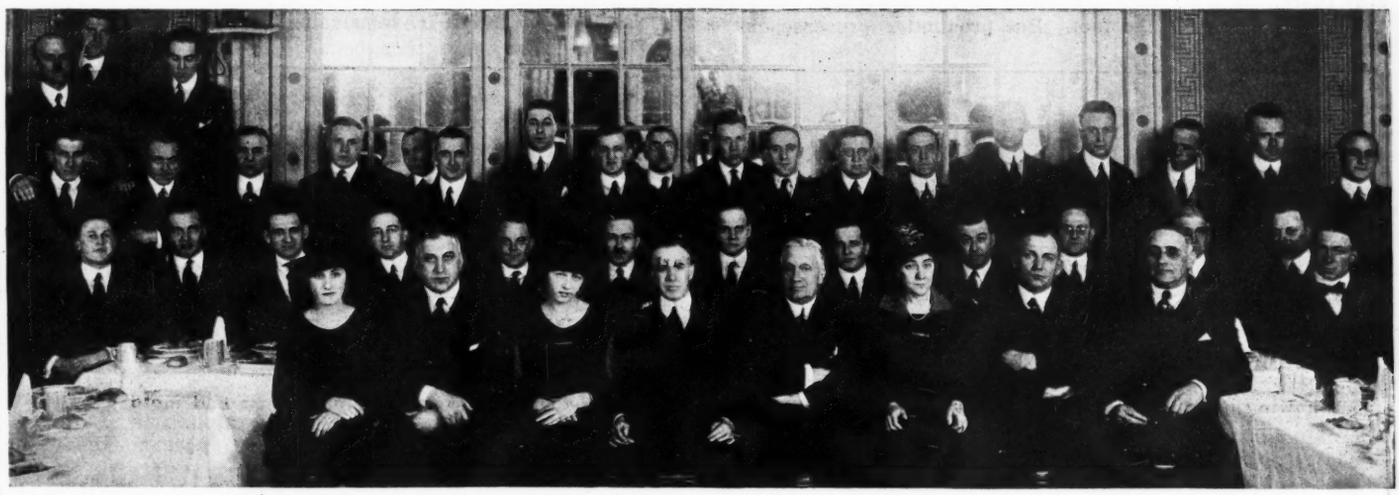


Not so many, perhaps, but the Leslie F. Smith dealers made that up in enthusiasm



Jordan dealers "got together," but they didn't exactly all get around the same table

Columbia dealers indulged in a little decoration for their dinner



Oldsmobile forces believe in the "co-educational banquet"

EDITORIAL

Getting at the Truck Show

JUST why it was considered wise to stage the truck show last week at a point as remote from the center of things in New York as the Eighth Coast Artillery Armory does not seem to be clear. Certainly it is not clear in the minds of those dealers and prospective dealers in trucks who visited New York for the purpose of taking in both the automobile show and the truck show. The story which was going the rounds at New York that the reason the Madison Square Garden was not used was a financial one.

THE truck exhibition at Chicago, which also runs simultaneously with the passenger car show, is not as close to the center of affairs in the Windy City as might be desirable, but certainly the stock yards are not as far away as the site of the Gotham truck show was. There seems to be considerable doubt among some of those interested in the shows, that a truck exhibition is necessary and if it is, that it should be at the same time, and therefore play second fiddle to the passenger car show.

What of Aircraft?

PERHAPS some of our readers may express astonishment this week at the prominence given by MOTOR AGE to its account of the first aircraft exhibition given last week at the Coliseum. They may feel that the airplane has not reached a sufficient stage of development to warrant so much attention.

MOTOR AGE has covered the show so extensively because the manufacturers of air craft seem to feel that the natural outlet for their products is through the ready established automotive dealer. The automobile and truck dealer is the first agent an aircraft manufacturer thinks of when he considers marketing his product. And as this is the case, it is only proper that the automobile dealer should know just exactly the status of the product he may be called upon to handle.

HOWEVER much the aircraft may have been developed in the last decade, it is certainly still far from being a commercial possibility in the sense that the passenger car or truck now is. Development in this field is being held back by the lack of proper landing spaces for the commercial planes already in existence and this fact is holding up any quantity production which, in the case of the motor car, rushed development. The aircraft may be a coming article of common sale, just as the motor car is today, but assuredly that time is not in the immediate future.

Real Salesmen Needed

WHILE merit and ability always have brought some measure of reward in the automotive industry they have not been so conspicuously successful in general as they are destined to be henceforth. Up to the present time, generally speaking, demand for automotive equipment of all kinds has been in excess of the supply.

NOW we have reached the point in the progress of the industry where the real merchandiser will come to the front and stay there. It is not that demand is letting down any. Indeed, the exact reverse is the fact. But productive processes have been so vastly improved that henceforth supply will tread on the heels of demand.

THIS means that the real salesman will supplant the mere order taker. The merchandiser will dominate the distributive end of the automobile trades. Every plan of merchandising which has real merit will be enhanced in value from this time on. The plain reading on the signboard which indicates the future of the business is to study merchandising methods, and if the goal of success is to be reached safely every device of ability and talent in salesmanship must be employed.

DON'T FORGET

Motor Age will start its series of

STANDARD MECHANICAL OPERATIONS IN TRACTOR SERVICE

Showing in pictures steps in repairing tractors, which are kindred to the operations in repairing trucks and motor cars

BEGINNING IN THE FEBRUARY 5 ISSUE

Saturation Point?—Nowhere In Sight as Yet

American makers will have to fill an export as well as a domestic demand first

PESSIMISTIC observers who profess an ability to see the period of saturation in the automobile industry and point to the enormous production program planned for 1920 in support of their views are reckoning without their host.

A glance over the world field dissipates any such dark forebodings when the proportion of motor vehicles to the people of America and foreign countries are taken into consideration. The export business already in sight and the vast virgin territory where the automobile rapidly is forcing its way holds a market that will develop a demand sufficient to keep factories working uninterruptedly for years to come.

The crest apparently is nowhere in sight. Every day there come stories of the arrival in America of representatives of dealers in the faraway corners of the earth where a few years ago the inhabitants were looked upon as uncivilized and incapable of stepping into the procession and keeping time to the march of modern progress. From far off India, Japan, China and the Island of Guam, agents bring stories of the inroads of the automobile and the commercial vehicle backed by striking photographs furnishing practical proof of their statements.

One Car to Fifteen Persons in U. S.

Automobile manufacturers basing their calculations on the program outlined for 1920 figure that by the end of the year the ratio in America will be about one automobile to every 15 persons. Looking at the situation from a strictly American standpoint, there might be good reason for advancing the opinion that the law of supply and demand soon would mean the saturation point.

However, the men who have developed the industry until today, it stands second only to steel in commercial and financial calculations, long since realized that the market must be broadened and new fields opened if the continued flow of motor vehicles was not held up by lack of demand. Representatives of those manufacturers have beaten the bushes throughout the foreign countries and spread the gospel of the automobile in every clime. Leaders in the industry have gone even farther and have surveyed the field with the view to establishment of foreign factory branches, and it is safe to assume that a few years more will find the continent honeycombed by a network of automobile factories owned by Americans, using American materials and equipment to a great extent, supplementing the American effort to satisfy the demand for cars of American design and manufacture.

In Canada the proportion of motor vehicles to population is one to 50, Australia one to 160, England one to 200, Denmark one to 300, France, Germany, Holland and Belgium one to 400, Italy one to 1000, Portugal one to 1690, Spain one to 1900, Austria one to 2650, and Russia one to 5000.

No European Quantity Production

Many factors enter into the situation to preclude the possibility of quantity production in Europe, even though the prejudice against foreign cars in contrast with American models could be eliminated. Europe is war torn and the moneyed men of pre-war days today are on the ragged edge. Financing the long struggle stripped the country of the money needed now so badly to rehabilitate the manufacturing enterprises. In France particularly and in Russia and various other countries the first consideration must be given to reconstruction of industries that furnish the absolute essentials of life before financiers can begin to discuss plans for investing hundreds of millions in automobile factories to compete with the Americans.

Factories for the manufacture of clothing and shoes and food-stuffs, ruined by the war, first must be rebuilt. The fact that raw material in abundance is to be found in various sections of Europe holds no terror for the American manufacturer of automobiles. The factories and machinery for the development of that raw material must come before European manufacturers can begin to think of competition with the American product.

One of the high officials of a leading company fixed the replacement percentage annually at 35. The same official declared his company in 1920 would divide its business on a 70-30 basis as between domestic and foreign delivery. With these figures as a basis there is allowed but 35 per cent of the output to be taken care of by original American demand. With the population increasing more rapidly each year, the scale of income mounting with the peak not yet in sight, the one time prejudice against the motor vehicle virtually wiped out and the automobile growing in popularity with each day, the 35 per cent allowed for new business will in no sense measure up to the demand, he contends.

Factories Plan to Expand

Confidence in the future of the industry is reflected in the expansion plans of all factories. Careful survey of the field will fail to reveal one manufacturer who would sanction a retrenchment policy or will be found willing to sit steady and content himself with the present-day program. Alterations and additions that will permit of trebling and doubling the factory output is the rule and financial plans of many of the leaders contemplate a combined total that is staggering.

Chief among them, of course, is the plan of the General Motors Corp., the stockholders of which voted to increase the capitalization to $1,000,000,000, constituting the largest individual corporation in the world with the exception of the United States Steel.

Some idea of the vastness of the plans outlined for 1920 production is furnished in the reports issued by leaders in the industry in the Detroit territory. The Ford Motor Co., with an output of 800,000 cars in Detroit and the Canadian plant just across the river, has set 1,000,000 as the goal to be reached in the two plants in 1920. So intent are Ford officials on keeping abreast of the rapidly changing situation, a forecast of the 1920 plans as regards additions, alterations and improvements to meet the constantly increasing demand would be useless. Details are wrought out as the demands for expansion develop, the policy being to keep thoroughly abreast of the ever shifting panorama. The Ford engineers are constantly employed on such refinements and changes as will enhance the popularity of their particular product and at the same time create increased demand for motor vehicles generally.

Overland Plans 200,000 Output

Buick Motor Co., during the fiscal year ending June 30, 1920, will have produced 140,000 automobiles, unless something unforeseen interferes to halt the present product of approximately 550 each day. Plans for the next fiscal year call for 280,000, exactly double the output of the current year. Two additions to the Buick plant at Flint, Mich., now are in course of construction and others are contemplated, all designed to give increased capacity for working out plans of progressive assembly with speed as the keynote. The new buildings are being erected in the proper relations to the present structure to permit of the uninterrupted progress of the product, from raw material to the finished car, with the least possible cost in individual effort and the greatest possible speed.

Willys-Overland with a production record of 75,000 cars in 1919, has scheduled an output of 200,000 cars during the current year. The Overland production was hampered seriously by labor trouble last summer, that, together with the transition from 100 per cent war work and the development of two new models, decreasing the total materially. The company has purchased a large tract of land at Elyria, O., and will erect new buildings that will permit doubling the production of Knight cars. The company will continue to produce the Knight and Overland Four and plans are rapidly being completed for a Six

to be built in Michigan by a company practically a unit of the Willys organization, though details of the plan have not been made public.

Hudson Motor Car Co., and Essex Motors completed their 1919 schedules of 20,000 of each model despite delays due to fuel shortage, the steel strike and other unavoidable interruptions. The 1920 mark set for production of the Super Six is 30,000, while 40,000 Essex cars will be manufactured. During the last year $2,250,000 has been expended in acquiring additional land, the erection of new buildings and plant equipment and machinery, making possible the increased output for 1920. The companies now occupy territory aggregating 71 acres and have a floor space of 1,300,000 sq. ft.

Paige production in 1919 was 15,776 cars and the schedule for the current year is 37,000. This increase is made possible by the new factory plans which contemplate utilization of 47 acres. The first unit of the new plant, 400 by 600 ft. and four stories high already is well under way and additional units will be constructed as rapidly as human ingenuity will permit. The company placed on the market Jan. 1 a new five-passenger light Six, distinctly the company's own design as regards manufacture, engine, chassis, etc.

Hupp to Build 24,000 Cars in 1920

A building plan involving an expenditure of close to $10,000,000 and which will require about 5 years for completion attests the confidence of Dort Motor Car Co. officials in the future of the industry. During the fiscal year ending Oct. 31, 18,649 Dort cars were produced and the production for the calendar year was 21,000. The schedule for the fiscal year 1920 is fixed at 30,000, a mark officials say will be easy of attainment by reason of the additions and improvements which will facilitate quantity production. The present model of the Dort will be continued, the only change that has been made being the substitution of a separate brake lever for the combination clutch and the placing of the gasoline tank in the rear of the car.

Extending factory facilities gradually to meet the increased production schedule, the Hupp Motor Car Corp. has outlined a program for this year that calls for 24,000 cars. Despite the lack of materials and difficulties encountered in shifting from a war to peace basis, the company increased its production 50 per cent last year turning out 18,000 cars, though like most of the other companies there was a roster of from 6000 to 8000 names of purchasers awaiting delivery of cars at all times. Hupp plans include a building program to extend over a period of four years in order to keep pace with the normal business that officials can foresee. The company will stick to the present model with such minor changes and improvements from time to time as will maintain their product at its present high standard.

Scripps-Booth Corp., operating as a unit of General Motors, built 8273 cars during 1919, but has scheduled an output of 20,000 during this year. Scripps-Booth plans possibly may be interfered with by reason of their inability to get into the Saxon plant Jan. 1 as was contemplated. The new Saxon factory purchased for Scripps-Booth containing 360,000 sq. ft. of floor space, now is being used by the government to store airplane material and latest reports are to the effect that it may be months before it will be turned over to the new owners. The company is far behind in production and officials insist from the present outlook it will be some years before the point of saturation will begin to loom. Scripps-Booth on Jan. 1 put a new line of six-cylinder cars on the market in four models showing many improvements over the former job.

Reorganization of Saxon Is Hopeful

Saxon production, which for various reasons was curtailed, reached a total of 3426 cars during 1919, but the goal has been set at 10,000 cars in the current year. Saxon furnishes an excellent idea of the optimistic view taken by bankers and financiers in the future of the automobile industry, in the ease with which the reorganization was effected whereby the company is assured of ample working capital to permit of the increased production program. The company is without debt and has a working capital of upwards of $2,500,000, the shift from near-receivership to financial independence furnishing striking evidence of the confidence of its financial backers in the industry's future. The new Saxon displayed for the first time at the New York show, a deluxe job with class in every line, again reflects the spirit of optimism as regards the future.

With the foundation laid for a new service building and 12 acres added to the original 12-acre site, the Liberty Motor Car Co. enters on 1920 production with full confidence in the increasing demand for automobiles and assurance that it can complete its schedule of 15,000 cars during the year. New building plans have not been completed but extensive additions on the newly acquired site are promised, a good barometer of conditions and prospects as viewed by Liberty officials. The output of the company in 1919 was approximately 10,900 cars. Liberty officials have devoted considerable effort to their all season type of cars, the sedan creating particular interest in the smartness of design and the refinements in upholstery and equipment.

Grant Motor Car Corp., hampered by the change from war work produced only about 4000 cars up to Sept. 1, when the company brought out a new model upon which it got into production Nov. 15, the total output for the year reaching approximately 5000. The production estimates for 1920 call for 15,000 cars, which schedule has been provided for in additional buildings and plant expansions.

King Motor Car Co. officials see nothing in the future but constantly increasing demands and have completed plant expansions and improvements that will permit the trebling of the 1919 output in the present year. The company was organized in 1911 with a capitalization of $200,000 to manufacture a four-cylinder car to sell at $1575. It produced close to 1000 cars the first year and now has 13,000 in operation. The 1919 output was close to 3500 cars. The company now has a capitalization of $700,000 and is producing four models.

Maibohm Motors Co. produced 1050 cars in 1919, the output having been curtailed by fire which destroyed the plant at Racine, Wis., and interrupted production for several months. The company operated on a small scale in temporary quarters at Sandusky until near the end of the year when the new factory was completed. The 1920 schedule calls for 7500 cars, production of which is assured by factory plans formulated but even that output, company officials say, will not put them nearly even with the demand. The company has a 25-acre site and its new factory building, 120 by 673, includes its own body plant. Additional loading platforms, dry kilns and 1000 ft. of siding also will be constructed to care for the increasing demand. The present plant is equipped to permit an output of 50 cars a day.

Nelson Increases Output

E. A. Nelson Motor Car Co., which produced 600 cars in 1919, has set 4000 as the output in 1920 and to assure success of the program officials now are formulating plans for immediate factory expansion.

Barley Motor Car Co., manufacturers of Roamer cars, will build 4000 during the present year, the production for 1919 having been kept down to 1600 by various interruptions and lack of facilities. Improvements now in progress at the plant and additions contemplated give evidence of the confidence of officials and assurance of fulfillment of the proposed program.

The W. A. Paterson Co. will more than double the 1919 output according to the 1920 schedule. The company built 1400 cars last year and has set 3000 as the peak this year.

FORD TO BUY GLASS WORKS?

Detroit, Jan. 9—Reports that the Edward Ford Plate Glass Co., of Toledo, O., soon will be announced as the latest addition to the Henry Ford interests, followed an inspection trip to the Toledo plant by Ford and his son Edsel and the announcement immediately afterward that improvements to cost $600,000 would be made.

None of the Ford Motor Co. officials would admit the manufacturer had taken over the glass plant, dismissing the query with the statement that he had visited the Toledo property to look over the possibilities of the plant for supplying the huge demand for glass for Ford cars. Officials, however, recalled Ford's an-

nounced determination eventually to manufacture every part that goes to make up a Ford car, virtually an admission that he had decided to include the Toledo plant among his holdings.

Despite the fact of the similarity in names the Fords in the Toledo company are not related to the Detroit manufacturer and up to the present he had been in no way connected with the company, according to officials. The Edward Ford Plate Glass Co. is located at Rossford, a Toledo suburb and the proposed improvement will mean 600 additional employes. Plant No. 1, which closed soon in 1914 on account of difficulty in obtaining supplies, due to government demands, again will be in operation by April.

With the proposed improvements to plant No. 2 the capacity of the factory will be increased by 8,000,000 sq. ft. The present production of 9,000,000 sq. ft. of glass annually will be doubled. Contracts for 45 new houses have been let to care for the new employes. The payroll with the increased force will approximate $1,000,000 a year.

HOLDING COMPANY FOR LEXINGTON

New York, Jan. 12—Formation of the United States Automotive Corp., to operate as a holding company for the Lexington Motor Co., and other companies affiliated in production of the Lexington car, was announced in New York by Frank B. Ansted, president of the Lexington Company, who is here attending the national automobile show.

The new corporation will have a capital of $10,000,000 in preferred stock, and 200,000 shares of no par value common stock. It is to act as a holding company for the following subsidiaries: Lexington Motor Co., Ansted Engineering Co., Connersville Foundry Corp., and the Teetor-Hartley Motor Corp., all of which are in Connersville, Ind., except the last named.

Officers of the new corporation are Frank B. Ansted, president; George W. Ansted and Frederic I. Barrows, vice-presidents; James M. Horon, treasurer, and LeRoy A. Hanson, secretary. Directors in addition to the officers are William B. Ansted, Charles C. Hull, John C. Moore, Arthur A. Ansted, Emery Huston, and Elmer J. Hess.

UNIVERSITY TO HOLD TRUCK SCHOOLS

Detroit, Jan. 9—Trucks and tractor schools to be conducted at the Michigan Agricultural College in February and March are expected to attract record attendance. The schools will be conducted under the auspices of the farm mechanics department and a dozen different trucks and tractors will be used during the course. One of the requirements for a diploma will be familiarity with all the leading models of trucks and tractors.

The constantly increasing use of gasoline power in farm work and the need for adequately-trained men in the handling of farm machinery is destined to make the motor schools the most popular of the winter courses offered at the college. Each school will run four weeks, the first beginning Feb. 2 and the second March 1. Ignition valve and spark timing, carbureter adjustments, brake and fuel consumption tests, lighting and engine trouble work will be among the subjects emphasized. Actual adjustments and repairs on trucks and tractors in the laboratories will play a prominent part.

Implement Men Missing Big Opportunity of Tractor Trade

CHICAGO, Jan. 12—Close attention to the proceedings of the conventions of retail implement dealers that have been held so far this year lead to the conclusion that the sales managers are missing fire in their effort to impress the retail implement dealer with the importance of the tractor trade and to make him see that he would better get himself into shape to handle it if he expects to retain any very considerable interest in it.

"Is the retail implement dealer measuring up to expectations as a seller of tractors and power farming machinery," is the language used at all conventions of retail implement dealers this year to define that issue which the manufacturers most want them to discuss.

At the time the Sales Managers' Division of the N. I. V. A. met in annual conference some time ago it was decided to suggest this as the main topic for discussion at each of the forthcoming conventions. Requests to this effect were sent to the secretaries of the several associations with the result that in most cases an entire session at each convention was set apart for the consideration of this subject.

Manufacturers' Views Presented

To impress the dealers with the importance of the topic the sales managers delegated certain of their number to visit the conventions and there to present the manufacturers' viewpoint on the tractor question. In years gone by the sales managers have contented themselves ordinarily with sending one representative to meet the dealers in conference on live topics of interest to the trade. This year, however, it was decided to enlarge each delegation by sending two or three members of the division. In this connection it is significant that the ablest men have been selected as a rule.

The men who have been chosen to represent the sales managers for the most part have been old line implement men, men who have a preference for the retail implement dealer as the distributor for all manner of farm operative equipment.

Because of this the dealers are being assured time after time that they enjoy the preference of the tractor manufacturers and that the latter are looking to them to take hold of the tractor business and to prosecute it to a successful conclusion.

It has been notable, however, that most of the men who up to this time have represented the sales managers at the conventions have not dealt much with facts as they exist at the present time in the tractor trade. Where it has been necessary to recognize such facts for instance as to the extent to which the motor car dealer has gone into the tractor business they either have been deprecated or excused. In hardly a single instance have they been met fairly and squarely.

BUFFALO SHOW CHANGES SITE

Buffalo, Jan. 12—Buffalo's annual automobile show will be held for the first time this year in the 74th Regiment Armory, the show having outgrown the Broadway Auditorium in which it was formerly held.

The armory has one of the world's largest floors, free from obstructions of any sort. It is surrounded on four sides with a balcony and seating space is provided for between 8000 and 10,000 persons. The use of the armory assures space to all dealers and manufacturers who desire to exhibit, according to E. H. Baker, president of the Buffalo Automobile dealers' Association, under whose auspices the show is being held.

DES MOINES PLANS ITS SHOW

Des Moines, Iowa, Jan. 9—With the definite dates, Feb. 16-21, named for the 1920 show the Des Moines Automobile Dealers' Association has put plans under way to make this year's show eclipse any of its predecessors. For the second time the Des Moines show will be held in the new Ford plant, which gives greatly increased room over the Coliseum, where the show was held up to last year. There will be more space than there was last year by reason of the fact that no tractors will be shown and the entire second and third stories of the Ford building will be devoted to passenger cars and trucks.

HARTFORD SHOW THIS WEEK

Hartford, Conn., Jan. 12—All is in readiness for the thirteenth annual automobile show of the The Hartford Automobile Dealers' association which opens at the Broad street armory, Saturday afternoon, January 17, under the auspices of the First Regiment, Connecticut State Guard. Forty different makes of cars and 14 different makes of trucks will be displayed by the twenty-nine members of the association. It is expected to be the best show in the history of the organization.

Olympian Motors Sold to Otis C. Friend's New Company

CHICAGO, Jan. 13—Purchase of the Olympian Motors Co., Pontiac, Mich., by the Friend Motors Co., headed by Otis C. Friend, has been concluded. The organization of the new Friend Motors Co. was announced in MOTOR AGE issue December 14. Mr. Friend is president and other officers will be announced later. Consummation of the deal by which the Olympian Motors Co. is turned over to the new concern clears away considerable uncertainty as to the status of the negotiation, inasmuch as it was not definitely known for a time whether the Olympian Motors Co. would pass to the control of Friend or to David Henry, a Chicago financier.

The situation was further clouded last week by the filing of a suit in Detroit to prevent the sale, although it is understood that the sale had been made before this action was taken. It also is understood that the suit was filed under misapprehension and that the matter has been adjusted with the complaining parties.

The Friend Company has issued $1,000,000 in five-year notes at 10 per cent to take over all the assets of the Olympian Co.

Otis C. Friend for a number of years has held a high position with the General Motors Corp., and previous to that time was president of the Mitchell Co., resigning that to become vice-president of the United Motrs Corp.

The Olympian Motors Co. was incorporated under Delaware laws May 16, 1916, with a capitalization of $1,000,000, which was increased to $2,000,000 in Jan., 1917. All common stock of the par value of $100,000.

STATE BODY ATTACKS A. A. A.

Utica, N. Y., Jan. 14—An attack on the American Automobile Association which was characterized as being in the "age of senile dementia and ancient discrepancy," by Melvin T. Bender, counsel for the New York State Automobile Association, marked proceedings before Supreme Court Justice Irving R. Devendorf in a hearing here on a permanent injunction asked against the state association by the national organization. A temporary injunction which restrains the state association from using the national body's insignia in its signs and other advertising was granted here a short time ago and the national body now seeks to have it made permanent.

Counsel for the state organization told the Court that the body was ready to stipulate in the proceedings to avoid a trial, but it was the opinion of the A. A. A. representatives present that the matter would come to trial for the benefit of public knowledge in the matter and to finally settle the question of alleged misrepresentation on which the action of the A. A. A. is based.

The A. A. A. was accused of surreptitious change of its by-laws by Mr. Bender, who told the court that constant change in the by-laws finally wore out the patience of the state association and it withdrew.

The action brought by President David Jameson, of Newcastle, Pa., was based primarily on the fact that a sign displayed by the Utica Motor Club hung on a Utica hotel bearing the A. A. A. insignia.

CANADA IMPORTS TRACTORS

Toronto, Ont., Jan. 12—It may seem incredible at first glance, but there are more tractors being imported into Canada this year than automobiles and trucks put together. Of course, this is explained by the fact that comparatively few cars are imported "whole." Engines and parts are imported to the value of many millions of dollars. The vast majority of cars are assembled in Canada. The increase in the number of cars manufactured in their entirety in Canada is also showing an encouraging growth.

During the first eight months of 1918, there were 9162 autos and trucks imported into Canada from the United States, and none from Great Britain. In the first eight months of 1919, there were 7919 autos and trucks imported from the United States, valued at $7,961,005. In addition, three pleasure cars and six trucks came from England.

The importation of tractors, valued at less than $1,400 in the country of production—the vast bulk—from January 1 to August 31, 1919, aggregated more than 8000, with a value in excess of $8,000,000.

CUNNINGHAM GETS RECORDS

ROCHESTER, Jan. 9.—The Cunningham Automobile Co. in this city has been notified by R. Kennesdell, chairman of the contest board of the American Automobile Association, that Ralph de Palma, driving a Cunningham stock automobile had set three world's records at the Sheepshead Bay Speedway in New York City on Nov. 17.

The records were set in non-competitive speedway trials and are as follows:

Distance	Time
6 miles	3:37.8
8 miles	5:16:6
10 miles	6:35:4

The fastest two-mile lap made in the trials was 1:18:4. After the trials were made De Palma drove the car back from New York to Canandaigu, N. Y., a distance of 391 miles in 8:35:0.

When the car was received at the Cunningham factory it was dismantled under the direction of the American Automobile Association officials, who checked up each point of construction in an effort to determine that it conformed entirely with the Cunningham stock chassis specifications. The official records were not issued until this check had been completed and passed upon by officials in New York City.

Detroit Motor Thefts Lower as Result of Prosecutions

DETROIT, Jan. 13—Automobile thefts in 1919 were 35 per cent lower than in 1917, according to the annual report of the Detroit police department, though an increase of 24 per cent was shown over 1918. Recoveries by the police amounted to 77.80 per cent, the percentage of recoveries in December reaching 91.1. Thefts of 3,482 motor vehicles were reported during the year, valued at $3,165,327 and 2,709, valued at $2,697,689, were recovered, leaving 773 unaccounted for.

Vigorous prosecution of thieves and protests against leniency for those convicted, as carried on by the Detroit Automobile Club are held responsible for the decrease in thefts over 1917. The figures for 1918 are not taken into account for the reason that the work or fight campaign of the government and the demands of the military kept crime at a minimum.

The police automobile squad made 710 arrests during 1919, among which were 99 fugitives from justice arrested for police of other cities. Convictions were secured in 117 cases in Detroit courts and juries returned verdicts of not guilty in only 10 cases. The campaign against leniency begun several months ago by the automobile club is being continued with vigor and the actions of each court are being given publicity in all daily papers in paid advertisements. Every step in each case is included in the advertisements which appear to be having a wholesome effect on prosecutions.

APPLICATIONS FOUND DEFECTIVE

Philadelphia, Jan. 12—Out of 250,000 applications for 1920 automobile and truck licenses filed with the State Highway Department, 100,000 have been found defective and returned to the applicants for correction. The rules are so complicated and difficult to understand that several car dealers in Philadelphia have opened bureaus especially to instruct applicants for licenses. Most of the defective applications failed, among other things, to give the number of the engine, the manufacturers' number, and the candlepower of the lamps.

The automobile division of the Highway Department has issued more than 100,000 licenses. In 1919 there have been 449,000 licenses in force in Pennsylvania. The number for 1920 promises to greatly exceed it.

POST NEW ILLINOIS LAW

Quincy, Ill., Jan. 9—Motor car dealers and garage owners in this territory have posted notices, covering the new automobile laws, which went into effect Jan. 1st.

All garage and service stations must secure name and address of owner of each car stored with him, engine number, etc.

All bills of sale must be made out uniformly and a record kept that is easily accessible.

A fine of $200 or sixty days' imprisonment for an intoxicated person driving a car.

Dealers here are planning a show for the spring months, covering both passenger cars, trucks as well as tractors.

STORE TO BUILD GARAGE

Detroit, Jan. 12—Parking space for 150 delivery trucks and cars and an up-to-date service station, repair department and stock room, will be included in a new garage to be erected here for Crowley, Milner & Co., department store. Plans for the building, which will be of brick and tile, with steel frame and sash and which will contain 50,000 square feet of floor space, have been completed by Horace H. Lane, architect, and construction will begin Jan. 1.

The garage will front 250 ft. with a depth of 200 ft. and will have four entrances.

Akron Show is Big Success Exhibitors Enthusiastic

AKRON, O., Jan. 9.—Automobile manufacturers and dealers are enthusiastic over the success of the annual automobile show staged last week in the new Central garage, the largest building of its kind in the world. Buyers outnumbered pleasure seekers throughout the week and from the moment the first sale was made by F. C. Subbald, of the Packard Motor Sales Co., a half hour after the doors were opened Saturday Dec. 27 until the exhibition closed last night salesmen were busy with their order books.

The results exceeded the most sanguine expectations and at the conclusion of the event the "boosters" held an impromptu executive session in which the show was voted a splendid success. More than 200 passenger cars were on exhibition during the week and not one but had its sponsors in the buyers' personnel. As a result all of the exhibitors were highly gratified and it was evident the public had been generous in sharing its patronage.

In addition to the passenger cars, which included open and closed bodies, in all models, trucks, tractors and accessories were on display with lighting plants occupying points of vantage in the big building. Practically every make of passenger car was represented, the total value of all exhibits being in the neighborhood of $1,000,000.

The building 140 by 330 ft., furnished an ideal location for the show, with ample aisle space to accommodate the large crowds that were in attendance throughout the afternoons and evenings. The two Sunday crowds and the throng that visited the show New Year's day furnished the surprise. Many of them were buyers and they did not confine themselves to any class or kind. Closed bodies, of course, enjoyed popular favor but purchases of open cars for spring delivery were in goodly proportion. It is estimated more than 50,000 persons visited the show. The entire six floors of the new garage were used, the third being given over to parking space for cars of visitors. The natural sloping of Ash street hill permitted driving into the building on any of the first four floors, the elevators being used to haul cars to the fifth and sixth floors only.

Ford's Gasoline-Powered Street Cars Offered Detroit

DETROIT, Jan. 13—Henry Ford's gasoline street car may be the solution to Detroit's transportation problem. In sending to the city council a message asking an ordinance for a bond issue of $15,000,000 to establish a street car system to be voted on by citizens in April, Mayor James Couzens declared it was possible the Ford car could be used. Experiments have proved the gas car no longer is a dream and Ford submitted figures to the mayor showing an annual saving in operating cost of $909,647, on the present mileage basis by the use of his car.

Ford's figures show that the cost of operation of the gasoline-driven car would be 31.41 cents a car mile whereas the figures submitted by the company for operating the present electric system were 33.08 a car mile. Mayor Couzens also told the council in his message the original cost of the gasoline car would be 50 per cent less than that of the cars equipped for electrical operation.

Passage of the ordinance is certain and ratification, by an overwhelming vote, is assured the plan for the municipally-owned system, which will relieve present congestion and serve wide territory now without street cars. The consensus appears to favor giving the Ford gas car a trial though that question will be left until after the election.

MOTOR DEALERS SUCCESSFUL IN TRACTORS

Kansas City, Mo., Jan. 12—Sixty per cent of the dealers in Kansas City territory handling a certain widely known tractor, are old-time implement dealers; they sold one, two, or three tractors the past year. Their sales were 30 per cent of the volume of sales in the territory.

Forty per cent of the dealers handling this tractor in this territory, are a new type, some of them former motor car dealers, some of them absolutely 1919 character of specialty tractor men. In this 40 per cent, are a few of the old-time implement dealers who found new life somewhere, who changed their tactics and graduated into real salesmanship.

This forty per cent, sold 70 per cent of the tractors that were put into farmers' hands in the territory.

"This forty per cent is largely new people in the farm equipment business," said the manager of this house. "They are specialists in farm power equipment, and they organize their business carefully, with rather up-to-date ideas in sales and service methods. For one thing, these successful dealers, even the smaller ones, have a combination sales and service manager and managers for other departments, if they sell other things. No man with a fairly big business, a growing business, can get ahead if he has to look after many details, many interests, himself.

"The successful ones, too, are not exclusively tractor dealers—they are selling equipment for the tractor to operate."

PLAN FOR TRUCK SERVICE

Quincy, Ill., Jan. 9—Daily motor truck service, freight and express will soon be instituted between this city, Mt. Sterling, Rushville, Havana, Pekin, Canton and Peoria.

Trucks will leave Quincy and Peoria terminus each week-day and the co-operation of the various commercial associations is being sought by the promoters, W. A. Diege and A. S. Sherrer of Peoria. Sec. C. D. Center of the Quincy Chamber of Commerce reports a company being formed for a truck service from this city to Beardstown, Ill., via Mt. Sterling. This line will be merged with the Quincy-Peoria line when it is ready.

FORGING INTERESTS ARE CONSOLIDATED

New York, Jan. 12—Consolidation of the Ingalls-Shepard Forging Co., Harvey, Ill., with the Wyman-Gordon Co., Worcester, Mass., is announced. Plans are under way for materially increased production in both plants, and for specializing to a greater extent than heretofore in the manufacture of crankshafts, camshafts, axles, gears, steering-knuckles, etc.

Service Gains in Importance at Show

Meetings of New York and Newark association bear out belief in importance of branch

By B. M. IKERT
(Motor Age Editorial Staff)

THAT service soon will be considered fully as important as the designing, building, advertising and merchandising of automotive vehicles, in a measure, was the main thought brought out at the first annual convention of Automotive Service Associations held in the assembly room of the Automobile Club of America Jan. 5. The meeting was held under the joint auspices of the Automotive Service Association of New York and the Automotive Service Association of Newark, N. J., and was attended by about 200 service managers from various parts of the United States, including several service managers from motor car factories.

Production Increases Importance

With the ever increasing production of automotive apparatus it becomes evident that the question of service will daily become a more perplexing problem, in view of the lack of trained mechanics and the scarcity of help generally. Organized service associations are an absolute necessity and will become more and more so as time goes on. The good of these institutions lies not only in the fact that it affords a get-together for the service men of the immediate vicinity, but collectively these associations will be placed in the position where they can make recommendations to the manufacturers of motor vehicles with the idea for the bettering of service. We have only to look at the work done by the Society of Automotive Engineers in its standardization work, where carbureter flanges have been made to a certain standard, where magneto bases are made so that one magneto is interchangeable with another on any engine, etc., to see the vast possibilities of service associations. Designing a motor car and servicing that car are two different things, and unfortunately the designers have not always given the matter of service the necessary thought. It is one thing to assemble an engine in the factory, but a vastly different thing to assemble the same job in a service station miles away.

Service Must Bind Sales

The service department of dealer's organization is put in a position where it must make good on the sale and delivery of a motor vehicle in order that the product may stay sold. The manufacturer as a general thing helps the proposition along to the extent of making good on the delivery of spare parts and the issuing from time to time of pamphlets purporting to show the most efficient way of performing any service operation. Sometimes these pamphlets help and again they are better off in the waste paper basket, because very often some clever mechanic has devised means and ways of speeding up a service operation infinitely better than the factory plan. This is made possible because men like this daily are required to perform work on cars the manufacturer is not called upon to do.

Unquestionably the most important phase in which this year's New York Automobile Show was in advance of its predecessor was in the holding of the New York and Newark Service Manager's Association meetings in conjunction with the show. Numerous valuable and interesting papers were read at the dinner given by these associations to which visiting dealers and their service managers were invited. MOTOR AGE herewith presents two of these papers and will present others in forthcoming issues.

The papers this week are those of Ralph Rognon, president of the New York Service Managers' Association, and Prof. Ethelbert Favary, head of the Automotive Laboratories, Cooper Union, New York.

Manufacturers Can Learn, Also

Only a short time ago we were brought into contact with a manufacturer of motor cars who had called in service men from various cities in order to show them the most efficient way of servicing that particular car. After getting into the work, it was found that getting the timing gears out of the engine was quite a job, with the result that the design has been altered so that now instead of half a day's job it is a matter of only an hour or so to do the work. This getting together of factory and service men thus resulted in a real accomplishment. There must be more of this getting together in the whole industry, if we are going to be able to take care of the service work of the future.

Many service men and mechanics complain of the difficulty of getting at certain parts of the cars they are servicing. They curse and foam at the mouth, but the manufacturer continues to build the model just the same way. By organizing these men will have in their associations an outlet through which suggestions and recommendations can reach the manufacturers through the proper channels. And this is one of the great possibilities of the service associations.

Complain of Inaccessible Parts

There were eight papers presented at the meeting and Alfred Reeves, general manager of the National Automobile Chamber of Commerce gave a short address on the importance of service and stated that the associations had the co-operation of the N. A. C. C. in every way. J. Howard Pile, secretary and general manager of the Automotive Service Association of New York talked on the benefits of such an organization and outlined the future plans by means of which it is hoped such associations will become a national institution.

Maj. R. A. Osman of the Motor Transport Corps., U. S. A., presented a paper on the necessity of co-operation between the automotive industry and the M. T. C. wherein he pointed out the value to the Government of trained mechanics and service men to keep the army moving properly in war times. He aslo spoke of the school being conducted in Washington, by the government where men are taught the ins and outs of shop work as regards automotive equipment. Other speakers included Al Rawson, president of the Automotive Service Association of Newark, who gave a paper on Selling Service, wherein he drove the importance of a clean shop and its influence on the business generally by giving the customers immediate and courteous attention. Prof. Ethelbert Favary, head of the Automotive Laboratories, Cooper Union, New York, spoke of the benefits of technical knowledge to the practical man. His paper in part follows:

Rognon Makes Good Talk

One of the best talks of the afternoon was made by Ralph C. Rognon, president of the Automotive Service Association of New York on the classification and development of service and service craftsmen. He divided his talk into four sections looking at the question from the manufacturer's angle, dealer's angle, owner's viewpoint and the service manager's viewpoint. His paper is printed in part herewith. Walter L. Hervey, member of the board of examiners of the New York public schools, spoke of education as it applies to service.

An open discussion followed each paper and there was a complete exhibition of service station equipment and labor saving devices in the corridors of the building. A dinner followed the meeting.

Four Angles to the Service Problem

Manufacturers', dealers', owners' and service managers' viewpoint must all be satisfied

BY RALPH C. ROGNON

President Automotive Service Association of New York

AT a recent meeting of our association, it was concluded after much discussion that Service was "An honest desire to satisfy coupled with the ability and facilities to render any assistance necessary to fulfill an obligation created by the sake and delivery of a motor vehicle." As a general definition, this is a good one, but from a strictly "service" viewpoint, I believe the defining of the word obligation in such a way as to make clear the motives of service organization a proper solution of our service problem. In defining Service there are four different angles:

Manufacturer's Angle

Service to the manufacturer is the means of proper execution of the square deal warranty, and the big factor in the maintenance of the reputation of his product.

Dealer's Angle

To the dealer the service station acts as an adjusting department, both mentally and mechanically, in assuming the obligations created through the guarantee of the product that he sells. An efficient service organization also means to the dealer the maintenance of the reputation of the product that he deals in, and is one of his biggest advertising assets.

Owner's Viewpoint of Service

To the owner an authorized service station means a concern that is authorized to execute the manufacturer's guarantee on the car that he purchased and a concern from whom he can buy the necessary highly skilled labor and repair parts for the proper upkeep of his motor vehicle. He naturally expects that the service station representing the manufacturer of his car or truck can repair it more efficiently and considerably cheaper because of their familiarity of the design and construction.

A Service Manager's Viewpoint of Service

Service is the product of a service station. In the manufacturer and dealer we have two customers whom we serve direct in mechanical replacements or adjustments for remuneration, and whom we serve indirectly when we efficiently serve our largest customer,—the owner. The majority of commercial products on the market today have as a foundation public need, and the concerns producing these products put their entire efforts into producing and advertising the need for their product. A service organization is a department or branch of the dealer or distributor, and if we are to successfully carry out our motives, we must commercialize the product of our department.

Our first step is to classify our product. and when we more fully develop it, it will be an easier matter to advertise and sell it. In classification of Service, we have six main heads, namely:

1—General Repairs; 2—Upkeep; 3—Inspections; 4—Rebuilding; 5—Supply of Repair Parts; 6—Adjusting of Complaints.

General Repairs

Under General Repairs comes emergency work, due to accident and breakdown from ordinary wear, neglect of upkeep, defective material and defective workmanship. This class of work composes the largest percentage of our repair work, and as a general rule, is clumsy and awkward to work on from a mechanical standpoint. In dis-assembling, we have dirt, greases and rust, fused and riveted metals to contend with. In assembling there is the relation between an old part to a new one to determine, and a thorough knowledge of theory, construction, specifications, clearances and metals, in all its ramifications.

Diagnosis of trouble of a used car is very difficult, and due to all these perplexing troubles and because the volume of this class of work is very irregular, we are forced to resort to hand work in production, which requires considerable more skill, patience and accuracy on the part of our craftmen.

General repairing is hard to sell right to the owner. Ofttimes the energy and material necessary to complete a job, involves an exorbitant financial outlay, when the actual results and the dependability of the mechanical condition of the vehicle as a whole is taken into consideration. By this, I mean a case where an owner should have had his car overhauled, and would only permit having his valves ground and bearings taken up, resulting in trouble in the near future to him and reflecting against our credit.

This particular part of our product is a peculiar one. We must be prepared and equipped to handle this work as efficiently as possible, but for us to advertise the need for repairs due to breakdown is a reflection against the product of the manufacturer and dealer. The cause for such breakdown should always be pointed out to the owner in order to prevent recurrence. Much stress must be laid upon proper upkeep and rebuilding at the proper mileage intervals, in order to cut down on the volume of this class of work and to save considerable time and money.

Upkeep as to proper lubrication and adjustment has been recognized by the manufacturer as one of the most important factors in the proper servicing of a motor vehicle. Instruction books and lubrication charts have been prepared by the manufacturer in such a way that the ordinary driver can easily understand them; in fact, some manufacturers have even painted their grease and oil cups a different color in order to call to the attention of the owner the importance of this work. Of the four classes of work coming under the head of General Repairing, it is surprising to learn that when every job ticket is marked "O. W." for ordinary wear, "N" for neglect, "D" for defect, and "A" for accident, that over 50 per cent of the jobs can be directly traced to neglect caused from lack of proper lubrication and adjustment.

Charge for Service Work

From a commercial standpoint, it is poor policy to try to educate the public. In fact, it has been repeatedly proven to be a thankless job. Therefore, in order to cut down on the volume of General Repairing, due to neglect, and thereby reducing cost of upkeep to the owner and reflecting credit on the manufacturer, we should maintain a separate department in our Service Station and install checking systems of upkeep as to proper lubrication and adjustment, based and charged for on mileage. This class of work if systematically handled, under proper supervision, can be performed at a profit with unskilled labor.

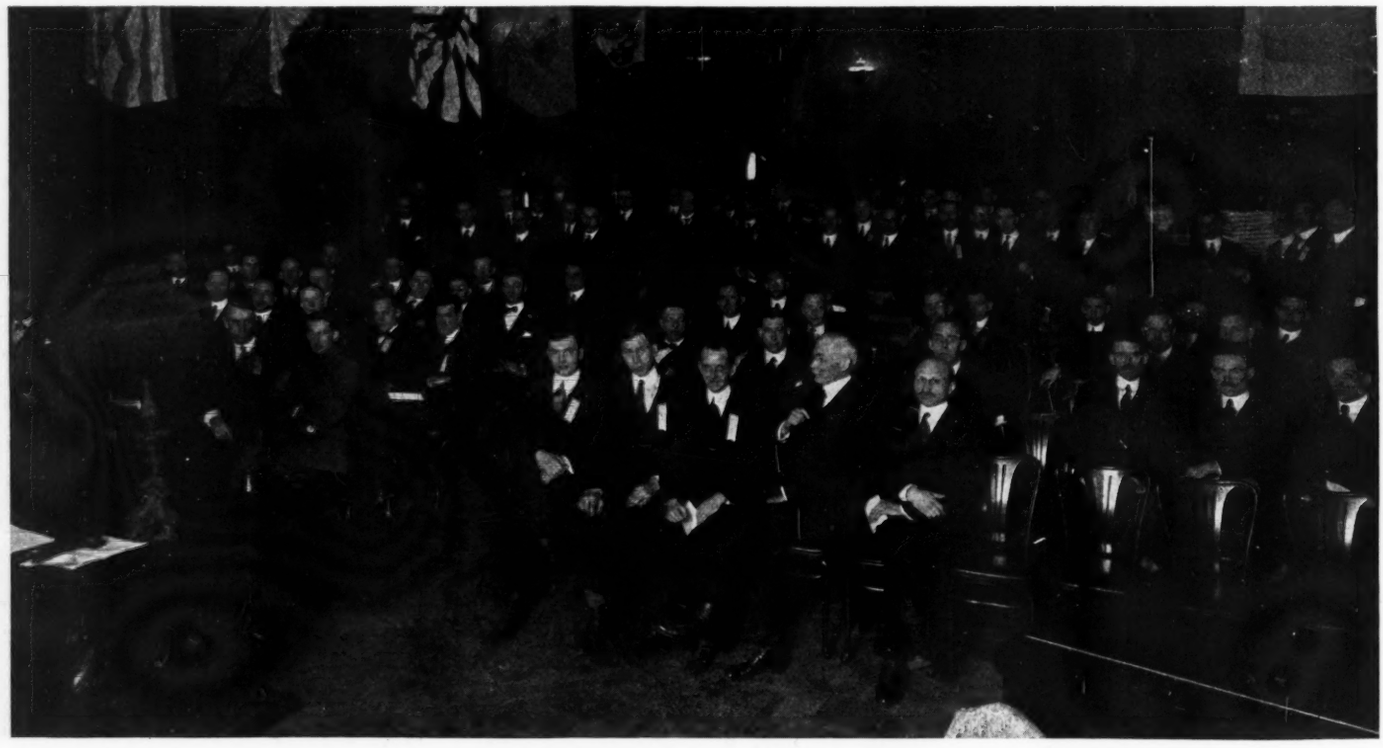
The working basis of this system is determined in the following manner:

1—The number of operations coming under the head of lubrication and adjustment at certain mileage intervals up to the 5000 mile interval must be determined.

2—The average weekly mileage of the particular owner on whose vehicle the system is installed must be taken into consideration in order to arrange calendar dates that will be agreeable to owner and Service Department.

3—Cost can be determined by the time required to complete the operation, plus the material used, times the number of mileage intervals during a period of 5000 miles. For example: A certain grease cup should be filled every 250 miles, consuming two minutes' time and one-half ounce of grease. In 5000 miles the owner would have called twenty times, at a cost to him of forty minutes' time, plus 10 ounces of grease, plus overhead expense and our profit. The different mileage intervals are represented as series A, every 250 miles, B for 500 miles, C for 1000 miles, D for 2000 miles,

Service Manager's Meeting



The large number of out-of-town dealers who attended the open conventions of the New York and Newark Service Managers' Association testified to the success of the venture

and E for 5000 miles. Each series consists of a certain number of operations.

The effect on the owner's attitude toward this class of Service is gratifying. He realizes the work is absolutely necessary, does not want to bother with it, and feels that we really have his interest at heart by taking this responsibility off his shoulders. From a Service viewpoint, it is considerable trouble to install this system, but the effort and expense is more than justified when we take into consideration that we are cutting down on the volume of general repairs and are making frequent visitors and real customers of owners. This results in not only profitable sales of accessories and other parts of our product, but eventually more sales of the manufacturer's product, which is certainly one of our motives.

Inspection

If the old saying "A stitch in time saves nine" has any merit, an inspection as to the exact condition of a car or truck is one of the biggest factors in its servicing. This class of work can be handled under almost the same conditions as upkeep, and in the same department. The policy of most manufacturers is to offer the owner free monthly inspection, whereas the conscientious owner fully appreciates the value of an honest systematic inspection, and is willing to pay for it. In fact, if free inspection were eliminated, and an efficient system maintained, it would result in a more honest and conscientious effort on our part and carry considerable more weight as to importance with the owner.

Rebuilding

Work of this nature is by far the most important and profitable part of our product. In order to commercialize it and advertise the need, we must point out to the owner the necessity of complete rebuild of his car at the proper mileage interval, so that his car will be in a dependable mechanical condition. Under the present conditions in most shops today, the rebuilding of a car costs the owner so much money and he so seldom gets the expected results, that he will keep it on the road until it breaks down or is completely worn out. This belated effort to repairs is costly, because of the large amount of new parts that are necessary. Repair work is gradually coming to a matter of production, and we are at present developing systems on a smaller scale, but similar to factory assembling. The equipment necessary to handle this class of work efficiently must be based largely on volume. The small dealer cannot afford this equipment, and had better devote his energies to upkeep, inspection and general repairs. Relative to rebuilding, it would be better for him to ship the car complete, or in various units, to the large central Service Stations, thereby making a fair profit and satisfied customer for himself, and furnishing a volume of this class of work for the large stations. This class of repair work is largely in the experimental stage, as far as production methods are concerned, and when fully developed the cost of this work will be reduced to a reasonable charge, with effective results, adding greatly to the dependability of the automobile and eliminating, to a certain extent, the trade-in evil that has handicapped, and in some cases ruined dealers.

Supply of Repair Parts

This part of our product is probably the most efficiently developed, due to the effective systems outlined by the manufacturer, and because of his familiarity with this problem.

Adjusting of Complaints

During the experimental stage of the industry, complaints, criticism of the design, construction and operation of the car, were shunted to the Service Department. At that time, the dependability of the manufacturer's product was misrepresented in order to sell it, and service was misrepresented because we were experimenting instead of efficiently repairing. We were called upon under these conditions to prove the dependability of the automobile to the public. We resorted to various methods in order to accomplish this, one of the worst mistakes being free service by way of atonement. During this period Service played a vital part in assisting to commercialize the automobile. But at the expense of our prestige with the public, the owner, as a general rule, considered a Service Station an Adjusting Department of the automobile industry, and we lost their confidence because they did not get the results expected.

Now that the dependability of the automobile has been proven, the Adjusting Department of a Service Station should be a mere detail. They can do

(Continued on Page 34)

"Technical Knowledge" Should Not Be a Bugbear

No service man can know his business without it, says Cooper Union professor

PROF. ETHELBERT FAVARY
(Automotive Laboratories, Cooper Union)

FIRST of all I would like to define what I understand by the term "Technical Knowledge." Many people have an idea that "technical" means "mathematical," or something mysterious with which they are not familiar. In my opinion it means simply "profiting by the experience of others," and to know and being able to understand what others have accomplished.

Let me give you a pertinent example of technical knowledge of your own work. Suppose you have to turn a piston of cast iron and another customer wants a piston of aluminum. How do you know what clearance to give them. You may be the superintendent of a big repair shop or service station, and they may be different makes of engines from those with which you usually have to deal with. How will you know what size clearance to give the piston for a cylinder of let us say, 4 in. diameter? With technical knowledge on this subject, you would know that for each material, a certain amount of clearance is necessary per inch of diameter or, if a piston of, let us say, 3 in. diameter, expands a certain amount, in a water cooled engine, a cylinder 4 in. in diameter will expand 1/3 more, as the engine piston is 1/3 larger in diameter. We can then set up a rule that from previous experience it was found that a cast iron piston expands so much per inch of diameter, let us say 3/100 for the piston head of touring car engines; then when our engine has a bore of 4 inches, we make a clearance 4 times 3/1000 which is 12/1000. The rest of the piston does not expand so much as the head so that is given a smaller clearance per inch of piston diameter, as past experience has shown to be correct. If you know the average practice, you will not make a great mistake, even though you may improve it if you had more pistons to make of that particular engine.

Aluminum Piston Clearance

Let us now say you have to make an aluminum piston for the same engine. Would you give it the same clearance? No, because aluminum has a higher coefficient of expansion. You say another mysterious term. It is only mysterious as long as we are ignorant of the meaning. When we know that it only signifies aluminum expands more than cast iron per inch of length, it is perfectly simple. Practice, let us say, has shown, that aluminum pistons need about 5/1000 per inch of bore, for the clearance of the piston head, or in our piston four times 5/1000, which is 20/1000 clearance. Of course, here too, practice varies somewhat, some manufacturers having found that in their particular engine it is better to give it a little more or less, as the case may be. But you certainly will be nearer right when you know what the average practice is, than when you are ignorant of it.

Let me give you an instance of good time wasted for the lack of a little knowledge. Some time ago a gentleman came to see me with a complete set of drawings for an engine which could be operated like a steam engine. A young, clever mechanic whom he had known for some time and in whom he had a great deal of confidence, interested him in the venture. He was just ready to invest a large sum of money when he spoke to a friend about it. As is usually the case, the friend advised him not to go into it, but he said he thought he would, because he had great confidence in the ability as well as the honesty of the mechanic who invented it. Finally, however, his friend induced him to see a consulting engineer and get some technical advice as to its practicability, and through some acquaintance of mine he called and consulted me. The drawings were most complete, even though crude in a measure as the mechanic had taught himself to draw, but he disclosed a great deal of ingenuity in working out the many details. He told me it took him over two years in his spare time, week days and Sundays, to finish the design of the invention. The principle of his machine was a large cylinder which compressed a volume of gas prior to ignition, and immediately thereafter the pressure from the explosion escaped into a sort of steam turbine; in fact he stated "it worked equally well with steam as with gas explosions."

Energy and Talent Wasted

Now here was good energy and talent wasted, simply for lack of a little technical knowledge. The mechanic was present at this interview and I asked him, after glancing at the drawings for a few minutes, if he knew what an explosion was. His answer was that it was a lot of pressure, obtained from an explosion. He did not know that an explosion is simply a rapid rise in temperature. And when I explained to him that if he could quickly by any means whatever, raise the temperature of a quantity of air a few thousand degrees he would have an explosion and that the pressure of the explosion was simply due to the fact that the air, or gas, expanded very rapidly on account of its rise in temperature, and this expansion gave rise to the pressure, but that an instant later the temperature would drop and therefore there would be no more pressure. In other words, I told him if he took a cylinder without any leakage, and without a movable piston even, and if he ignited an explosive mixture inside, at first there may be, let us say a pressure of 350 lbs. per square inch, but in a fraction of a second that pressure would dwindle down to almost nothing, since that high temperature of a few thousand degrees cannot be maintained. I never saw a more disappointed man in my life. He was quick witted and understood at once why it could not work. I did not have to tell him that it would not work, in fact he immediately started to explain to his capitalist why it could not work. Here was a case where a little technical knowledge would have prevented all this mis-spent energy and wasted talent.

In conclusion, I want to say a few words about the satisfaction a practical man feels when he knows the reason for the things he does. It elevates him in his own estimation, for instead of guessing at things which he had never done before he would be able to do them nevertheless, or instruct his subordinates how to do them, without the danger of the many mistakes frequently made, when trying to do a thing we don't understand.

Technical Knowledge Required

The whole industry will be raised when the people at the helm know their ends thoroughly. The practical man who works himself up to a better position is usually very able, and it would not take him long to grasp the technical end of the problem, and then the whole business will be more efficient, and the science of automatic service make progress. I believe the time is not far distant when the practical man will be required to have certain amount of technical knowledge, since labor is getting scarcer and the amount of work to be turned out increases in quantity. Here is a chance for many of you, to devise means and ways for doing more work with less labor and avoid mistakes. In fact, we shall have to come to that, with the ever greater scarcity of labor.

TRACTOR SERVICE
STANDARD MECHANICAL OPERATIONS SHOWN IN PICTURES
Beginning in the February 5 issue
of
MOTOR AGE

Digest of New York Show Cars

Service and Maintenance Question Given More Thought. Absence of Startling Color Combinations. Engines More Accessible

AMONG the more important thoughts gleaned at the New York Show is that the makers of motor cars generally are beginning to give the service question more study.

There is a vast chance for development work along this line, to be sure, but collectively the cars are easier to service than those of two years ago. Manufacturers who made Liberty engines or did similar war work have been taught that they can work to far closer limits than were deemed possible or necessary in pre-war days. Working to closer limits means better fitting parts and longer life not only to the units, but the car as a whole.

No Post-War Models

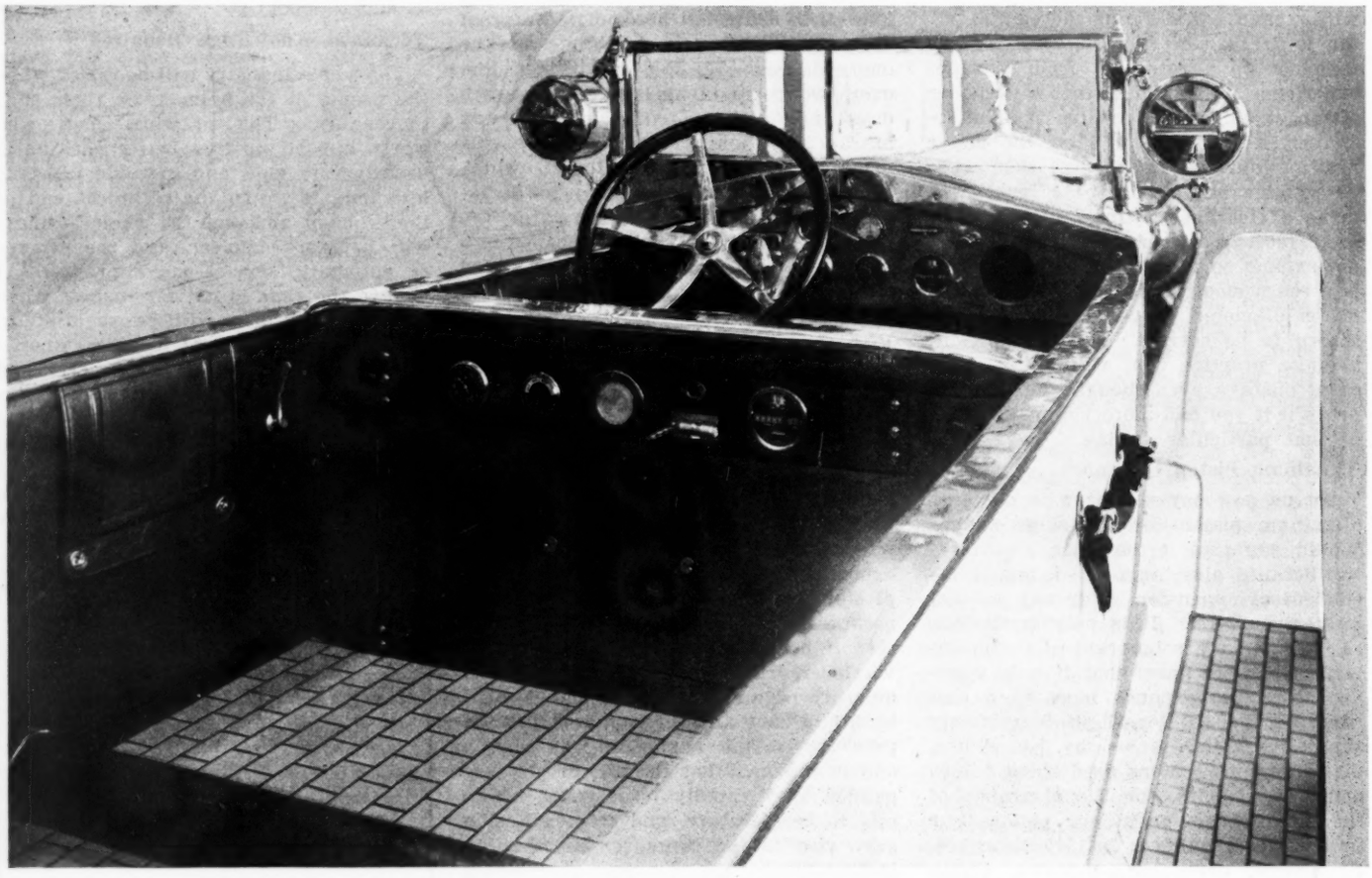
There were no startling new things at the show. We did not see the so-called post war models with airplane engines or cars with bodies built along the lines of airplane fuselage. The cars looked pretty much like those of two years ago save for the entirely new models of half a dozen or so makers. In some instances, it appears quite evident that makers are using up old stocks on hand in order to get cars on the market. Evidently the threatening car shortage this year coupled with the European and Latin-American demand for cars has caused the revival of production of some makes of American cars, which up to this time have held back on production.

Many Little Refinements

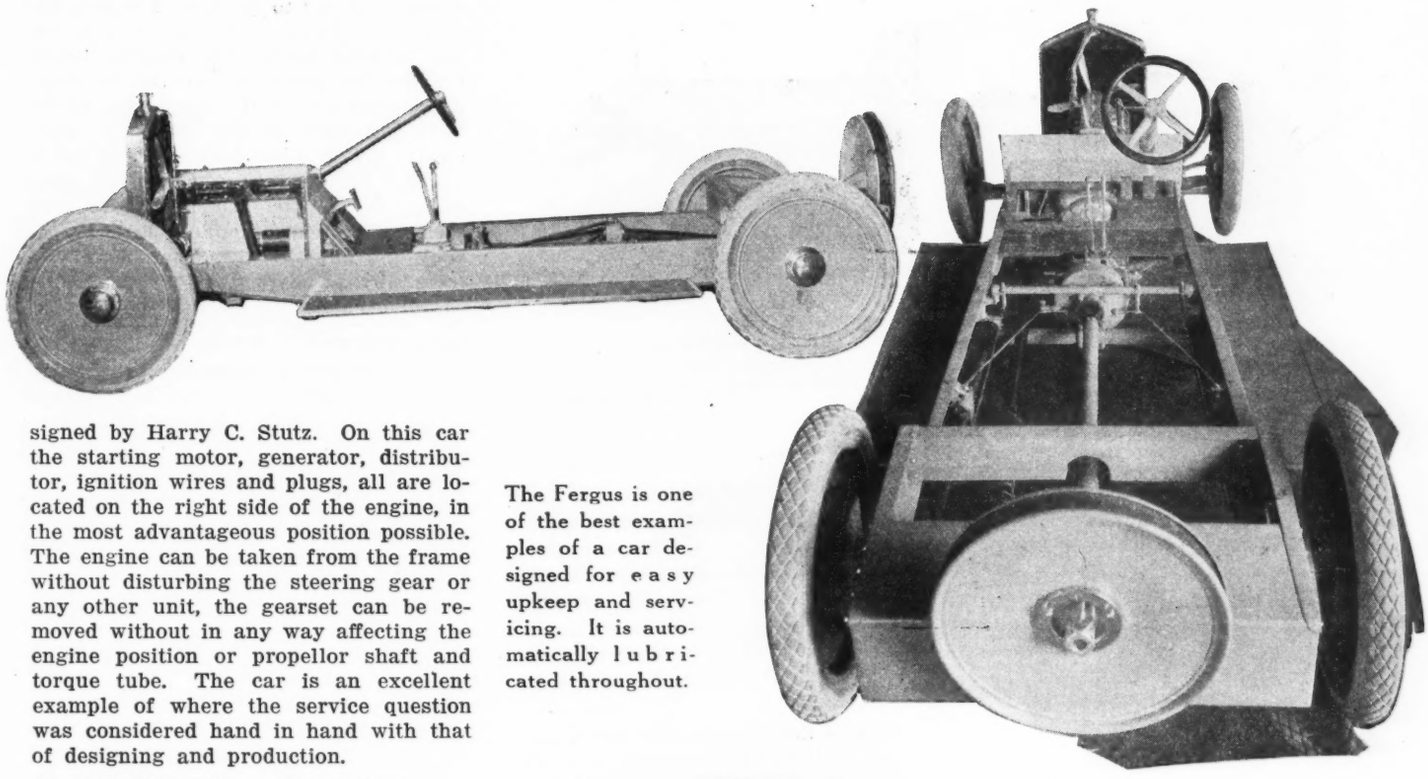
Though some models are continued on the same lines as their predecessors, there are little refinements here and there that make for the betterment of the product and more efficient service. We find gaskets under the oil filler caps on some of the engines; felt packing in small oil reservoirs on clutch pedal shaft brackets, which keeps foreign matter out of the bearing but allows the oil to permeate to the moving surfaces; better brake rod location on cars using Hotchkiss drive; elimination of grease cups; elimination of rights and lefts on certain chassis parts thus cutting down the replacement stock on that part 50 per cent; more abundant use of the drive shaft brake, which simplifies rear axle and chassis layout. And so it is possible to go on down the line of refinements and check those things which have been given thought in the engineering departments of motor car makers. It is quite likely that in some instances these refinements have resulted from the suggestions offered by the service stations of the country.

Engines More Accessible

Engines look much cleaner and are far more accessible except in a few instances where there is a multiplicity of levers and rods interfering with valve adjustment or getting at distributors, generators, etc. Probably one of the best examples of engine accessibility and clean chassis design is the new H. C. S. built by the H. C. S. Motor Car Company, Indianapolis, Ind., and de-



One of the novel bodies exhibited by the Charles Schutte Body Co., Lancaster, Pa. This body is exceptionally roomy and fitted with nickelplated top edges, windshield, etc. The floors and running boards are covered with an imitation tile material. The instruments on the rear cowl include speedometer, motometer, cigar lighter and other fitments.



The Fergus is one of the best examples of a car designed for easy upkeep and servicing. It is automatically lubricated throughout.

signed by Harry C. Stutz. On this car the starting motor, generator, distributor, ignition wires and plugs, all are located on the right side of the engine, in the most advantageous position possible. The engine can be taken from the frame without disturbing the steering gear or any other unit, the gearset can be removed without in any way affecting the engine position or propellor shaft and torque tube. The car is an excellent example of where the service question was considered hand in hand with that of designing and production.

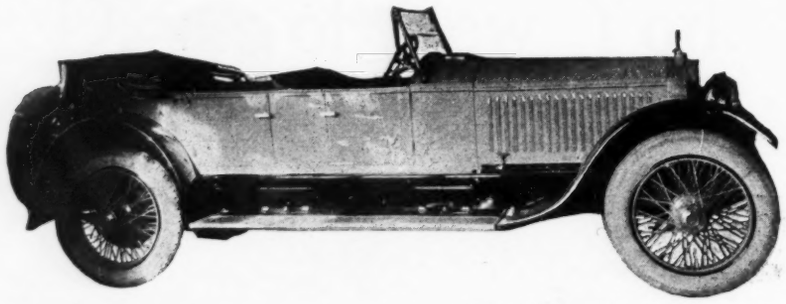
Poor Workmanship on Closed Cars

Regarding the closed models there is evidence of poor workmanship in many cases primarily, of course, in the lower priced cars. The most outstanding blemishes are poor door joints and clumsy fitting mouldings and trimmings on the interiors. Some of the door joints vary in width of from $\frac{5}{32}$ to $\frac{1}{4}$ in. or more. In some cases a beautiful turtle-back deck on a roadster has been spoiled by poor riveting of the rear fenders on the frame. There were few cars shown painted in startling color combinations. Where a body was shown in bright red, for instance, the wheels, fenders, etc., were painted red and thus the job did not look patchy as is often the case when hood and fenders or wheels are of a different color than the body. Red wood wheels were quite generally used on closed cars, the bodies of which nearly always were finished in black, dark blue or some other somber color.

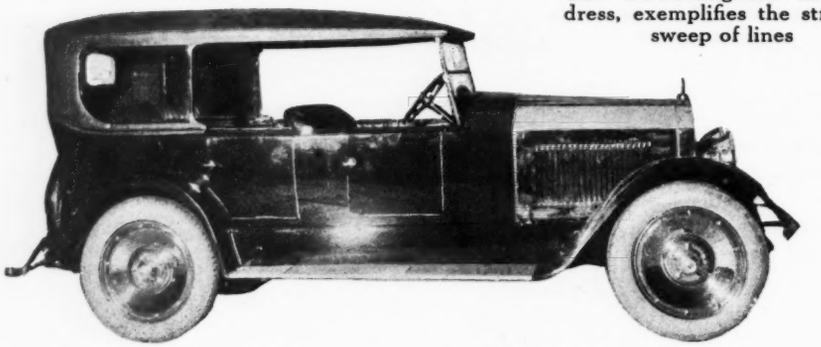
Vertical Windshield Gain Favor

The V-type of windshield or front end layout of sedans and coupes seems to be losing favor for the orthodox type of construction embodying a vertical shield. Some of the cars like the new Hudson sedan use a sun shade in connection with the windshield which when not in use rolls up under the front of the top. Exterior hardware of bevel edge pattern or square design seems to be the rule this year. Absence of running boards and substituting for them aluminum steps is gaining popularity and in some instances, notably on the new National, where running boards are used they have been shortened, leaving the front fenders untied to them. It is an open question whether or not this is good

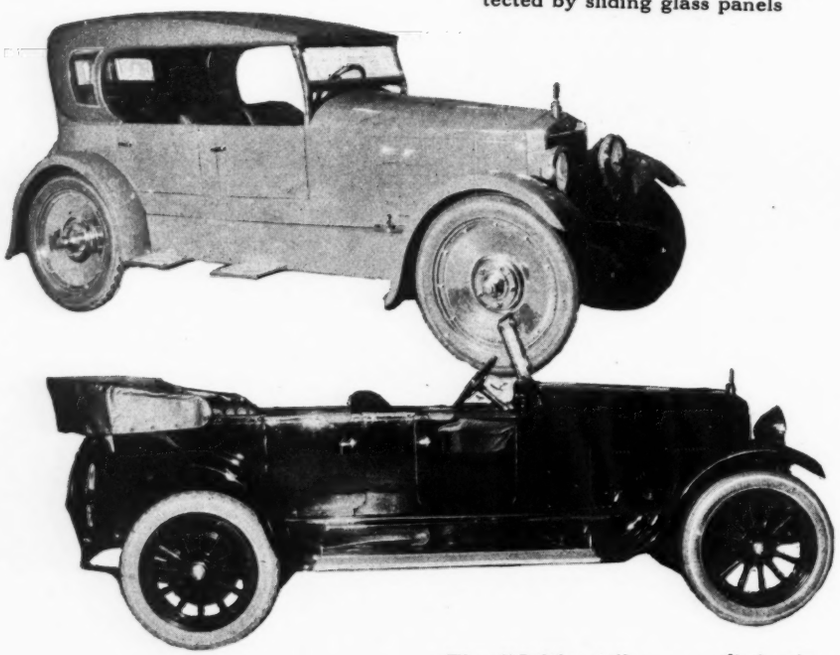
Three of the newest roadsters. The Mitchell, shown at the top of the group, exemplifies the typical lines of the new Mitchell bodies with the characteristic sloping windshield. The middle one is the Columbia with snappy lines. Below is the King with its sunken deck for the spare wheel



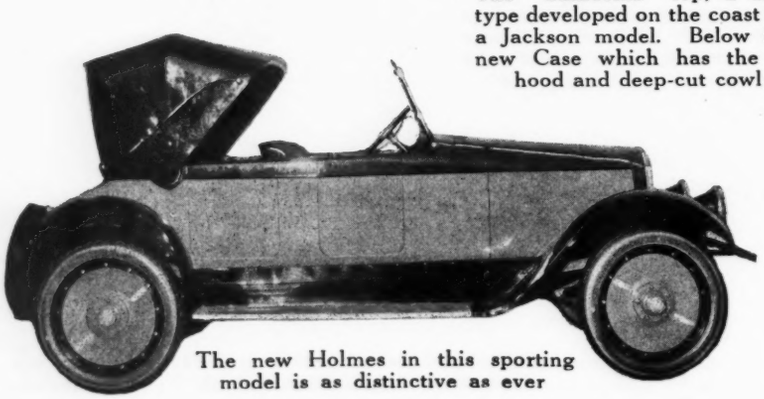
The Owen-Magnetic in new dress, exemplifies the straight sweep of lines



One of the Cole tourists was equipped with a new style of top in which the rear-seat passengers can be protected by sliding glass panels



The "California" top, a distinctive type developed on the coast featured a Jackson model. Below it is the new Case which has the straight hood and deep-cut cowl line.



The new Holmes in this sporting model is as distinctive as ever

practice, owing to the fact that mud and water are likely to be splashed in the gap between fender and running board. On the two-passenger sportsters doors are eliminated for the most part, as the body structure at this point is sufficiently low to allow passengers to get in and out without inconvenience. In some cases, as on the Templar, there is a series of vertical aluminum steps on the body, the finish of the latter being protected by a heavy leather pad neatly suspended from the edge of the body.

Cowl Instruments Scattered

More thought is necessary on the disposition of the instruments and fittings of the cowl boards. Instead of sprinkling them at random over the instrument board they might well be brought together and mounted as a unit. The Marmon method of doing this is an excellent example. Here the instruments not only have been brought closer together but protected by a single glass cover. The Van Sicklen combination speedometer, ammeter, clock, oil gage,, etc. has been worked out very well and we may reasonably expect this idea in one form or another on the cars at next year's shows.

In studying over the show cars we cannot help but notice the tendency for reducing the wheelbase. This is not due to any great objection to the long wheelbase, but rather to the fact that a long wheelbase will of its very design make the car heavier, owing to the longer frame. Much more room has been obtained in the driving compartments and tonneaus of cars of a given wheelbase by reducing the overall length of engines, which shortens up the hood and thus adds a few inches to the body. Engine makers have done their part by getting greater power output from a shorter engine. The smaller cars which heretofore have been considered hard riding have been improved by longer springs, to materially lengthen the period of vibration, which in former years has always been too short with most light cars.

Service Gets Attention

The matter of service and maintenance has come in for a considerable amount of attention on the part of car makers. This undoubtedly is one of the results of war work, inasmuch as the item of quick replacements of parts on army trucks was one of the first things considered in their design and production. It did not require much figuring that minutes were valuable in making repairs or replacements in the field. It was important that broken parts be replaced with the least possible delay and to this end the trucks were laid down on the drafting boards. Certainly it seems feasible to assume that our motor car engineers learned many valuable lessons from this and that we are beginning to see the fruits of their efforts along this line.

There are vast chances ahead of the car builders of this country along the

lines of maintenance development of not only the passenger cars, but trucks, tractors and any other piece of automotive apparatus, because it is the time element in the repair work that brings up the grand total on the bill, especially with mechanics' time anywhere from a dollar an hour up. No car owner likes to get a bill that shows $10 or $12 worth of labor on a job of replacing a part that cost perhaps but 50 cents or a dollar. The cars of the future must be so designed and built that the labor charges will be commensurate with the cost of the part involved. And we are beginning to see this done in the show cars of this year.

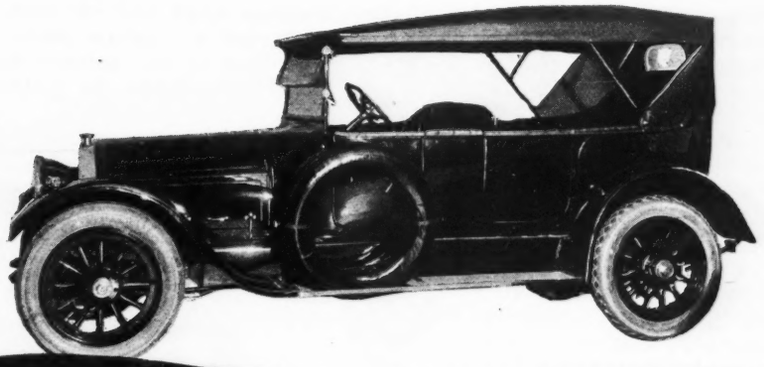
Cleaner Chassis Design

We can see it in the cleaner chassis designs, because the elimination of parts, making one part serve more than one particular function, as the integral step bracket and engine support on the new Briscoe, or the one piece rear spring bracket and step bracket on the H. C. S., all tend to simplify the repair jobs when these are necessary. As yet there are quite a few chassis on which there are too many inaccessible nuts and bolts which take many hours of fooling with and thus run up the labor charges. Complications are added by placing the nuts and bolts in such positions that mud and grit will eventually cover them up and before any work can be done the job must be cleaned. There is nothing gained in bringing out a car that is economical in the use of oil and fuel when the more common repairs which obviously must be expected in cars will consume all that has been gained in the one direction. Cars really will be economical to operate when the maintenance cost has been considered on the same scale along with operation.

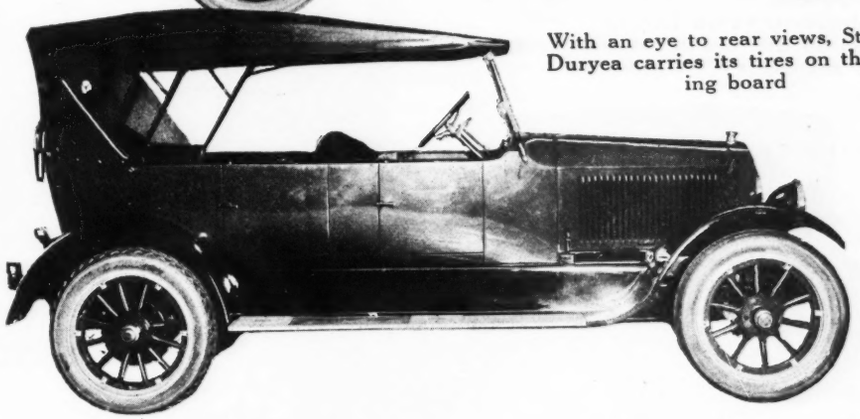
Few Changes in Body Design

The body designs have not changed very much so far as the exterior is concerned, excepting that the bevel-edge around the belt seems to be losing favor. It is still used, however, on many of the sport models. The high hood and straight-line body design evidently has come to stay for some time, being used on even the very newest cars like the Stanley steamer, Cleveland, Nash Four and others. While outwardly the cars of 1920 do not differ very much from those of the previous year the interiors have come in for more attention, due no doubt to the use of shorter power plants and a better balancing between the tonneau and driving compartment. The extra long tonneau and close-coupled front compartment is rare.

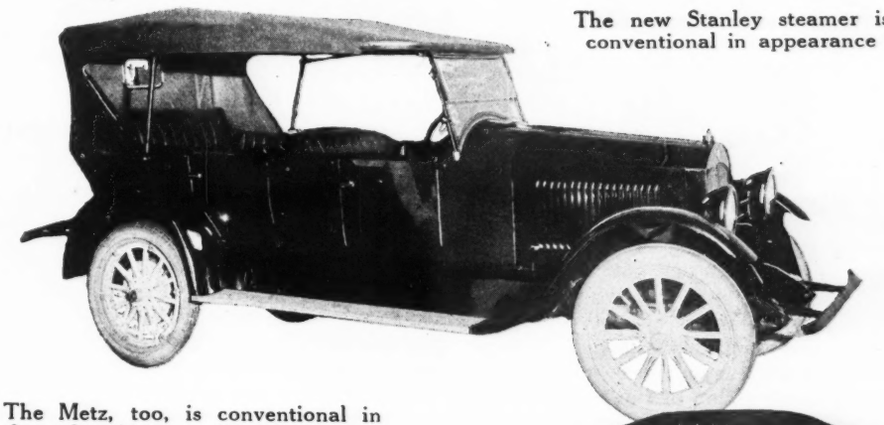
Curved lines are the rule, taking into consideration the products of the majority of makers, though in a few cases sharp corners and bevels are used. Regarding fenders there seems to be a tendency to go back to the older type using a drip-edge or skirt in place of the one-piece crown fender. The Essex is an example of this. While nearly all the fenders have a slight crown to them, the front fenders on all the cars have a double curve and there is a tendency to carry the rear fenders down quite low over the wheels. This is highly to be desired in car design and the layout looks much better if the bottom of the rear fenders are in line with the running board. Excepting on the sport models using no running boards, tire and extra wheel carriers are almost universally placed on the rear of the car, instead of on the side or in pockets in the front fenders.



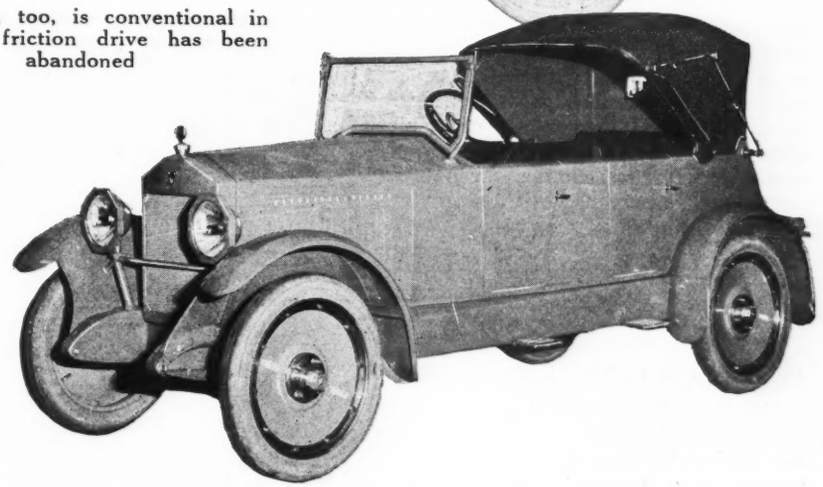
With an eye to rear views, Stevens-Duryea carries its tires on the running board



The new Stanley steamer is conventional in appearance

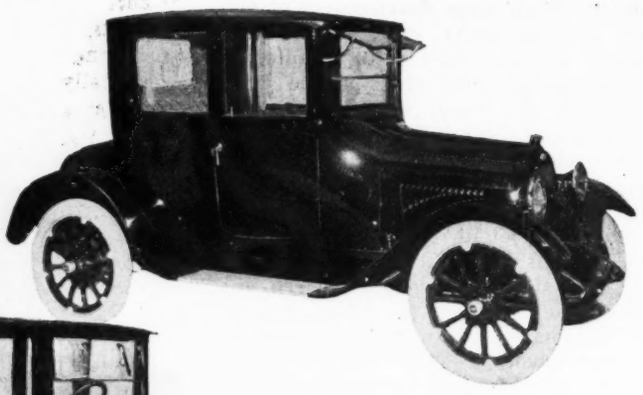


The Metz, too, is conventional in that the friction drive has been abandoned

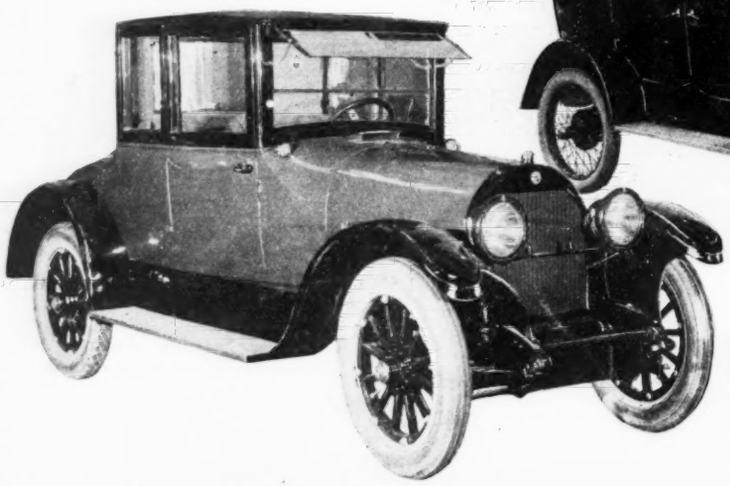


Velie always has featured striking sport models. This new four-passenger sportster is no exception

Here is a Pierce-Arrow inclosed body without the fender headlights which have been a distinctive feature of these cars



The Chevrolet coupe above, has many new features, the rain visor for the windshield is one



Above is the sedan on the little Overland four chassis. At left is the Cadillac coupe with straight line hood and cowl and ventilator in cowl

The sloping type of windshield which made its debut a few years ago is continued practically unchanged on nearly all the cars. This is not true, however, in some of the closed models and in one or two instances on sport models, like the new Jackson. On the latter a novel windshield layout is used, being in reality a combination of the straight and slanting types. The upper or main part of the shield is a single rectangular piece of glass bound with a nickel-plated edge and is mounted so it will swing inwards, leaving a vertical cross-piece which hugs the body intact. This prevents water from coming through and striking the occupants of the front seat. Small triangular pieces of plate glass are set in the lower corners of the stationary member and add greatly to the looks of the job, besides affording extra vision.

Upholstery is Improved

The features generally put forth for the sloping windshield are that it shortens the top by several inches and affords better vision, especially for night driving. It also reduces to some extent the wind resistance. In one or two instances the windshield has been given too much slant and thus interferes with getting into the driving compartment. One of the objectional things to the slanting windshield is that in time the rubber strip next to the cowl becomes damaged and in wet weather allows drops of water to strike the passengers.

Upholstery has been improved, the cushions are thicker and the backs of seats generally have been made more comfortable. Practically all of the upholstering is done in French pleats, which holds true in both open and closed models. Also most of the makers of the medium and low price cars are using fabrics made by the large chemical companies for upholstery work, because it has been shown in the past few years that these materials will outwear the cheaper grades of split leather. These fabrics are not effected by atmospheric changes and retain their color satisfactorily.

Fergus Design Unconventional

As is nearly always the case there were novelties at the New York show and among the most interesting this year was the chassis exhibited by the Fergus Motors of America, Newark, N. J. This chassis was called the American post war model and fairly bristles with departures from conventional car design and construction. The car has been on the market for a few years and has gained quite a reputation for its system of lubricating engine and chassis from a single oil reservoir. There are but three parts, the steering gear case and two front hubs that must be lubricated manually and this is necessary but once or twice a season.

The Fergus chassis is fitted with a six-cylinder engine 3¼ in. bore by 5 in. stroke, developing 80 hp. at 3,000 r.p.m. Valves are in the head and driven by an overhead camshaft through bevel bears and vertical shaft. Some of the engine features include a removable cylinder head, machined combustion chambers, machined crankshaft and connecting rods, seven-bearing crankshaft, aluminum crankshaft fitted with cylinder sleeves of special design, etc. The radiator is of square design and made of silver nickel. The engine is cooled by a pump, with thermostatic control. Delco ignition is used and the carbureter is a Zenith Duplex.

In the forward part of the transmission case is located the oil tank or large central reservoir from which the whole car is lubricated through a high pressure pump. The engine and transmission operate on the dry sump principle, all oil after use in these and all excessive oil in the differential housing, being returned to the main reservoir embodied in the case. The engine lubrication is automatically regulated according to the load.

No Waste Lubrication

All the oil used on the chassis passes through a large single area filter and grit trap, which easily can be withdrawn for cleaning. All road springs, brake shafts, speedometer drive cable and all other light parts are lubricated automatically by a positive system, but without pressure, which means certain lubrication to every part without waste of oil. Apart from the occasional filling

of the main oil sump, the oil level of which is shown by the gage, there are only three other places to lubricate, as mentioned before. There are no grease cups on the whole car and only two short oil pipes on the chassis.

Full Cantilever Springs

The front and rear springs are full cantilevers, exceptionally long and the frame is so made that both front and rear springs are housed on the inside of the frame members. The springs are covered with felt, oil-proof cases and leather outside covers in conjunction with automatically-lubricated spring housings. All cross members on the frame are tubular and the rear part of the frame is made to give an unusually large rear axle vertical movement and take all the excessive horizontal axle shocks. In mounting the powerplant its main weight has been taken direct on the front axle through the road springs and not through the frame. The service brakes are on the rear wheels and operate on 16 in. drums machined all over. The brake shoes are aluminum and a quick hand adjustment of the brakes is possible from the driver's seat. The emergency brake is at the rear of the transmission. The fuel tank is made to form the rear frame member and spare wheel carrier. Either right or left hand steering can be had, with central location of speed and brake levers.

The wheelbase is 126 in. and the ground clearance of the car 9 in. The height from the ground to the floor level when the chassis is normally loaded is 20 in. The approximate weight of the chassis is 2200 lbs. Wheels are of the disk type fitted with tires, 32 by 4 in. The chassis price is $7500.

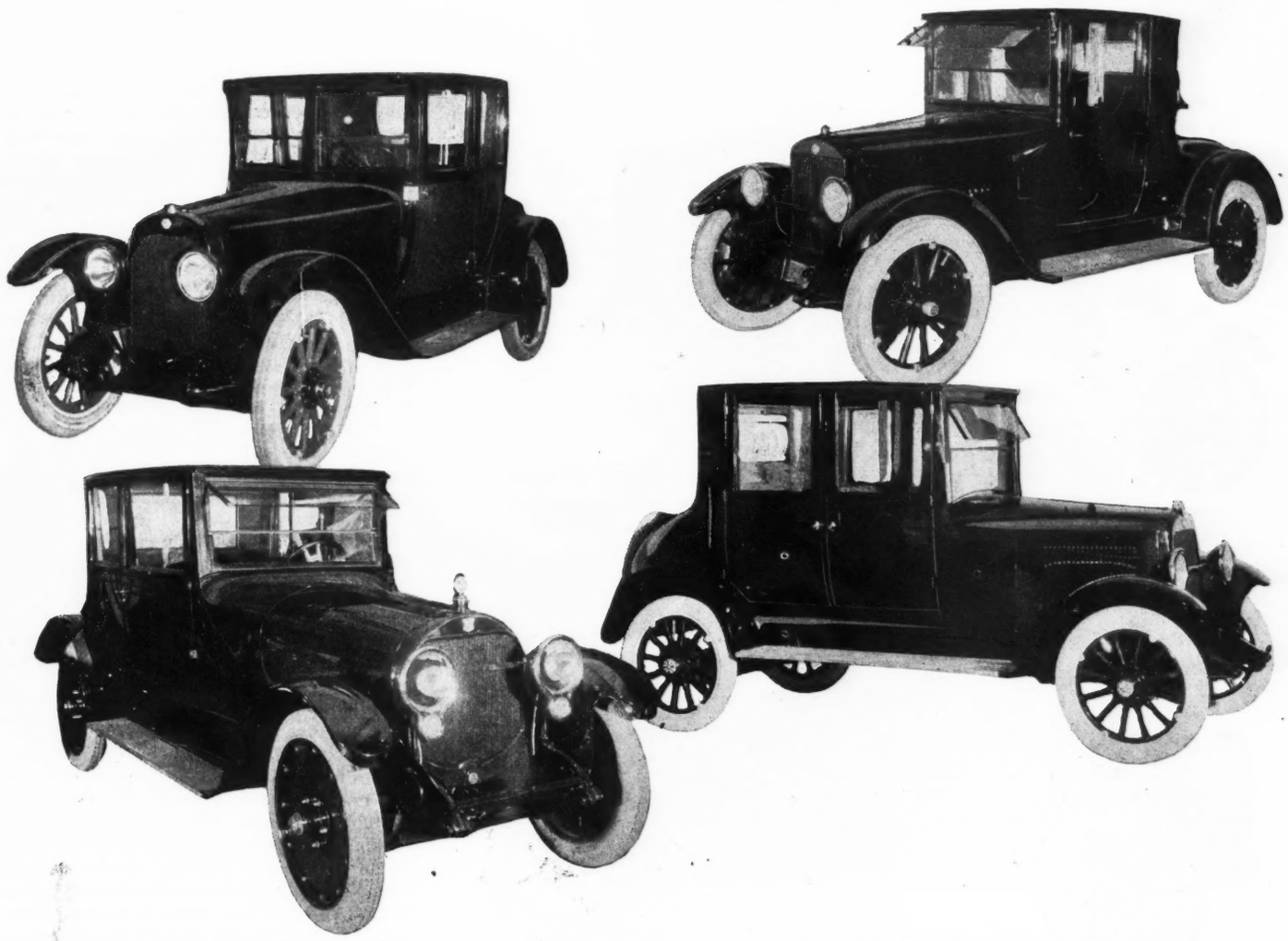
Schutte Exhibit Attractive

An exhibit that attracted much attention was that of the Charles Schutte Body Co., Lancaster, Pa., which concern showed three very well designed and built sport bodies. One of these was a two-passenger roadster body mounted on a Marmon chassis. The car was painted white with nickel-plated trimmings and red upholstery.

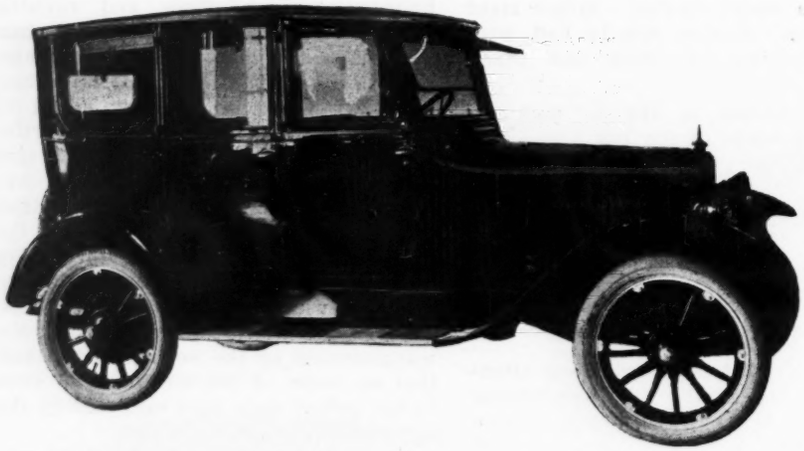
Special fittings like lamps, windshield door hardware, etc., had been added and altogether the job was a fine example of the body builders art. One of the other exhibits was that of a touring body, also painted white with nickel trimmings. The entire windshield and top edge of the body were nickel-plated, while the floor and running boards were covered with an imitation tile material. Special shaped lamps, radiators and massive cylindrical bumpers fully 6 in. in diameter added to the looks of this car. A beautiful turtle-deck type of speedster painted a bright yellow constituted the remaining exhibit of the concern. While it is true that these bodies are hand made, the excellent workmanship and originality of design certainly offer suggestions to the trade what is possible in body work. There was a sharp contrast between the workmanship on the Schutte bodies and that on some of the medium and even higher priced show cars exhibited by the car manufacturers.

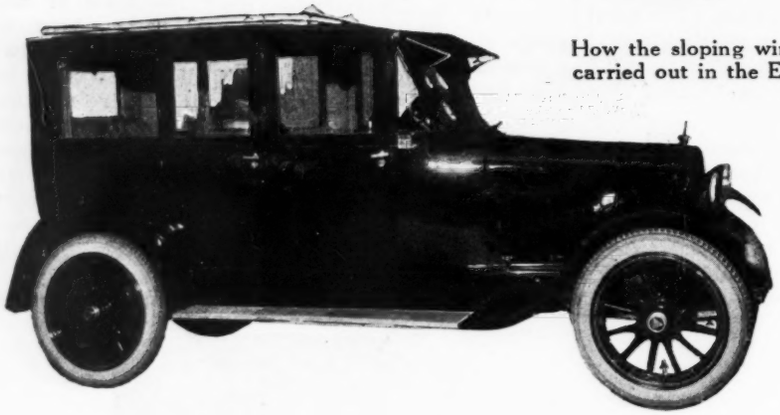
There seems little likelihood of any price decreases for the coming year, in fact the concensus seems to be that raises, rather than decreases may be looked for in the coming twelve months. The fact that the majority of the new cars which were first exhibited at the New York show were in what three or four years ago would have been termed the "high price class" is an indication of what the average of car prices will be in the coming season.

There has been no attempt to cut costs



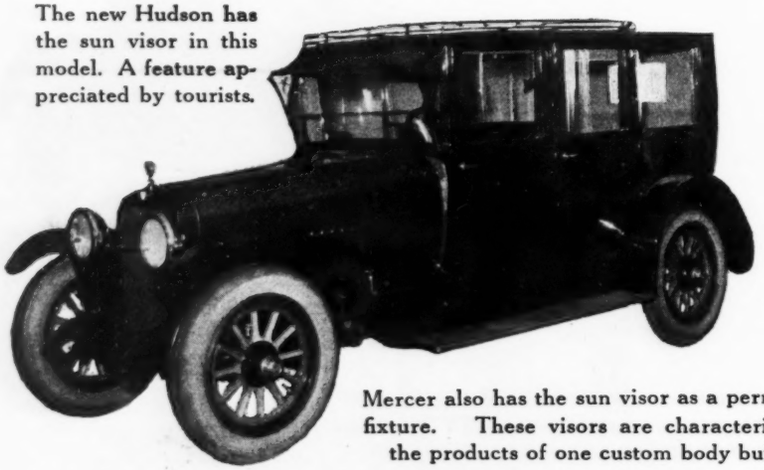
Upper left—The coupe body on the Nash Six chassis has distinctive lines; upper right—The Studebaker Cabriolet is one of the few convertible bodies on the program of the industry this year; lower left—This Haynes coupe is a new design and sports disk wheels; lower right—The Briscoe coupe in which the straight line idea is carried out both vertically and horizontally



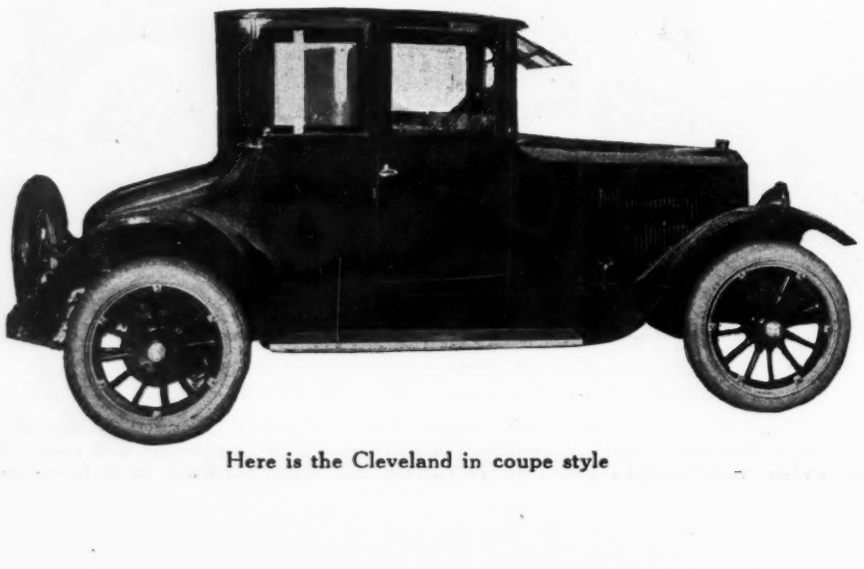


How the sloping windshield is carried out in the Elcar sedan

The new Hudson has the sun visor in this model. A feature appreciated by tourists.



Mercer also has the sun visor as a permanent fixture. These visors are characteristic of the products of one custom body builder



Here is the Cleveland in coupe style

this year for the sole end of achieving a low priced car. Rather, the makers have put into their cars every possible refinement and prices this year represent not cheapness but will be competitive only in the value given for the money.

Production for the coming year is one of the big problems of the manufacturers. Most of them have laid programs for greatly increased productions over last year's figures but whether they will be able to get those programs completed is another story. If the strikes which so hampered production in the latter months of last year are recurrent this season, it is highly probable there will be some companies unable to live up to their programs, but if the year is normally free from industrial strife, we may look to a far greater number of cars for 1920 than for 1919.

Favor Transmission Brakes

There is a notable gain in the use of transmission brakes, especially among the lower priced cars. This development may be explained by the fact that a single brake is less costly to manufacture than a double one, especially when it acts on a high speed shaft which permits of making all parts relatively light. On cars with unit power plants the brake pedal is located so near the transmission brake that an extremely compact and simple operating brake linkage is possible.

Frames are still being increased in depth of section and some of the frames seen today would have been regarded as freakish only a few years back. Even on such a light car as the Oakland Six, a 6½ in. channel is used. Possibly the increased popularity of enclosed models has something to do with the prevalence of heavy frames. There are few cars on which the doors still line up perfectly with the body sides after a year's use, and the only way in which distortion can be prevented is to make the side members more rigid, that is, of deeper section. With the same in view, the straight tapering frame is gaining adherents, for the offset at the cowl of the bottle-necked frame has always been a source of weakness.

Buick Has Lower Frame

The tendency to lower the frame with a view to obtaining a lower center of gravity is still continuing. Buick, among others, has redesigned its rear construction in order to lower the frame. The most advanced car in this respect is probably the new Fergus car, which has its cantilever rear springs inside the frame channels and has the latter cut off ahead of the rear axle so as to obviate the necessity for a large "kick-up" in the channels over the axle. Cantilever springs may be placed directly under the frame channels, outside or inside of same. Each arrangement has something to commend it, and each is in practical use. If the spring is outside the frame—assuming the latter to be of a given width—the load on the rear axle comes very close to the wheel and the bending

moment on the axle is consequently reduced. On the other hand, there is a strong twisting moment on the frame where it is supported on the middle of the spring which must be allowed for by the provision of a substantial cross member at this point. If the spring is directly underneath the frame channel, this twisting moment is eliminated. Perhaps the best thing that can be said for the spring inside the frame channel is that it is better protected from mud and water splashed up by the wheels.

Steel Crankcases Prevalent

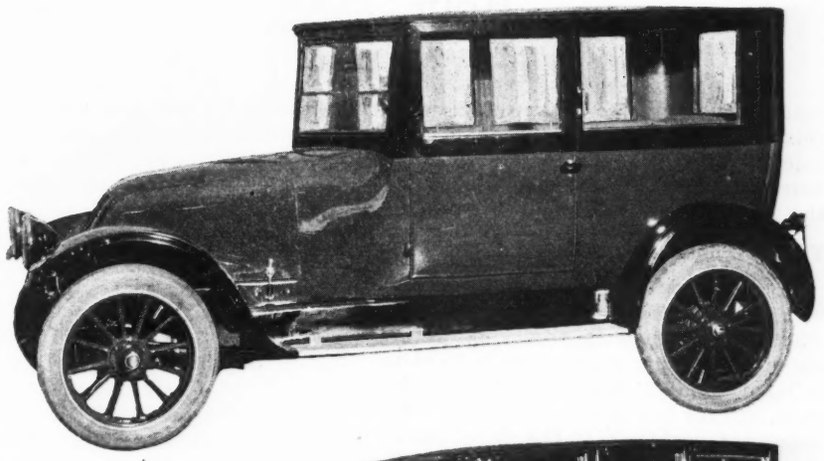
In engine construction, top halves of crankcases integral with the cylinder block and lower halves of pressed steel, are coming to be standard form of construction. This was first introduced on the lowest priced car, the Ford, and is working its way up. The advantages of this form of construction are by no means limited to low cost of manufacture, though that undoubtedly is the principal one. The liability of steel to rust is a minor objection in a crankcase which is generally sufficiently protected by an oil film. No doubt the difficulty of getting aluminum during the war period helped the pressed steel construction, and now that aluminum is plentiful again its competition with pressed steel as a material for crankcase construction may harden.

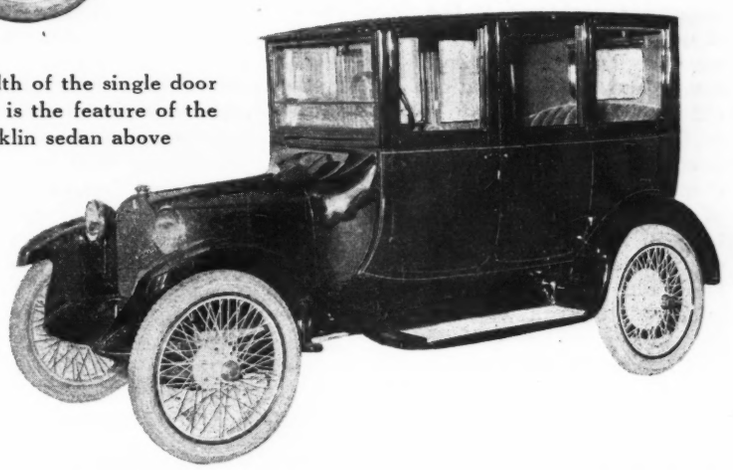
In ignition practice the battery system is now well-nigh universal. It was noticed that there is a tendency to place the ignition unit at the rear end of the engines, driving it from the rear end of the camshaft. Whether the object is to better protect it from moisture drawn by the fan through the radiator when it rains or is splashed up by the front wheels or whether it is to simplify the control connections and the cables to the switch and battery, it is hard to say. Possibly both ends are aimed at.

Pedals Should Be Standardized

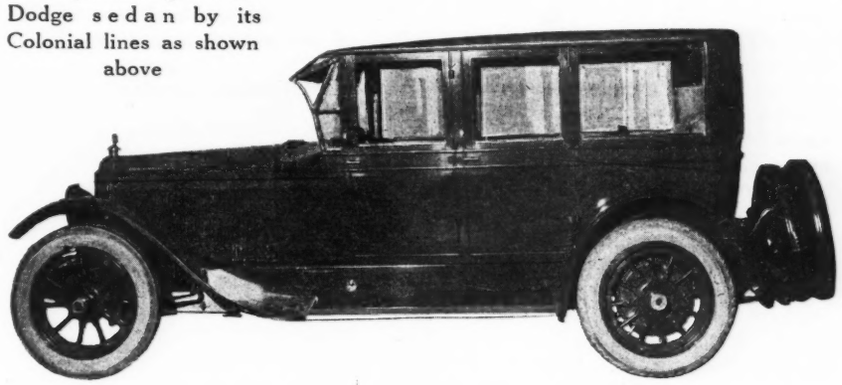
Pedals are now practically always made adjustable. It is rather remarkable what a variety of shapes and designs of pedals and pads is still in use. One would think brake and clutch pedals would lend themselves to standardization and if the designs were standardized these parts would be manufactured by specialists in large numbers for the trade. The type of adjustable pedal that appealed to us most is that in which the pad is provided with a threaded shank, which screws into a threaded hole at one end of the cranked pedal and is secured by a lock nut.

A large contribution to comfort in driving a motor car is obtained with the use of pedals which lend themselves readily to adjustment to the needs of the physical proportions of the individual driver. Possibly not many owners feel equally comfortable with pedals at the same distance from the seat as would be convenient for another. Thus the need of widely adjustable pedal lengths is established.

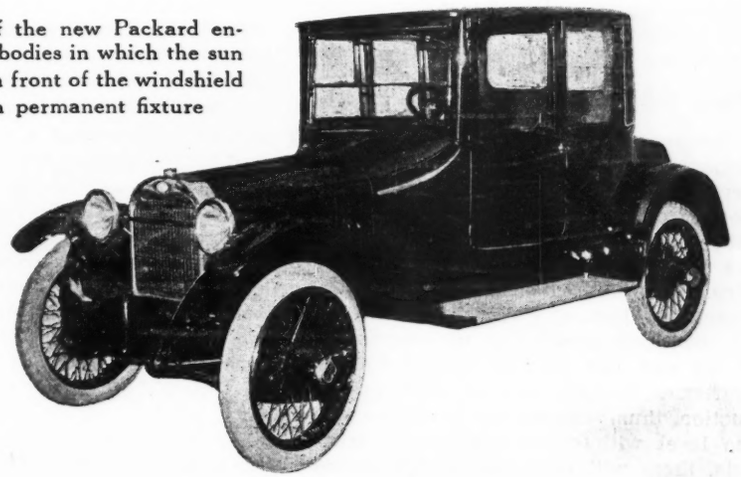




Great width of the single door on a side is the feature of the Franklin sedan above



Atmosphere is given the Dodge sedan by its Colonial lines as shown above



One of the new Packard enclosed bodies in which the sun visor in front of the windshield is a permanent fixture

The Oakland coupe in new lines

Four Angles to Service Problem

(Continued from page 24)

more to cut down the volume of the work this Department handles than anyone else by selling a vehicle with a clear understanding as to the interpretation of the guarantee.

The Development of Personnel

In developing the personnel of our Service Organization, we must develop men who are specialists in producing, advertising and selling service. It is hard to sell any product that is not fully developed, and for this reason one of our most important problems is the development of our mechanical producers. As a rule, we have three types of mechanics working in our Service Stations. First, the old experienced graduate machinist who is thorough, accurate, and entirely dependable. He is forced to follow his own plans in production, is slow from force of habit, and does not realize that we have to sell his labor in the form of a commercial product. He also guards his knowledge zealously, especially when he is forced to work on the same level as the lesser skilled men. Second—This type composes the majority of our mechanics. He is not a highly skilled craftsman and lacks knowledge, experience and initiative. He is greatly handicapped from both lack of incentive to study and proper facilities for education. Our third type of mechanics is extremely scarce, and is a real producer. He is usually a young man of American birth, with at least the equivalent of a high school education. He has some knowledge of mechanical and electrical engineering, knows the construction and theory of the automobile which inspires him with confidence, and has had several years' experience, resulting in the development of a very high degree of mechanical instinct and hand dexterity.

About his only fault is his Yankee spirit. We cannot keep him in our Production Department. First, he becomes a tester. Then a foreman, superintendent, service manager, and in many instances the Sales Department announces the addition to their forces of a very promising young salesman.

Many Vehicles to Service

Service is gradually reaching a production stage; it has been a lost industry, but prospects for its future as a commercial product are tremendous, when it is taken into consideration that we have over 6,000,000 vehicles to service. It is perplexing, and a deep study, from a mechanical standpoint, but is one of the most interesting of crafts, and if we can but develop enough skilled craftsmen to take care of efficient production, thus bringing our product up to the level with other commercial products, there will be a big enough future in our industry itself to create incentive all through the ranks. It will not be necessary for our craftsmen so soon as they reach a certain stage of development to step into another industry to insure them of a higher future.

Our biggest problem in development of our craftsmen is one of education, and before it can be successfully carried out an incentive to study must be provided. In most of our shops today we have a complete deadlock between our highly skilled and lesser skilled mechanics. The experienced men guard their knowledge with jealousy when forced to work on the same level as the lesser skilled men, whereas they should be their understudies best means of education. One of the most effective ways of overcoming this difficulty would be to depend on a man's pride in his craftsmanship to take an examination, covering knowledge of theory, construction, and of practical methods used in repairing. In this way we could classify our man, keeping a complete ability record of each. The highly skilled man would gain recognition and the others would have the course of study that they should pursue pointed out, together with the incentive. If we can accomplish this, we will have solved one of our best means of indirect education, and instead of jealousy we can substitute cooperation of the men between themselves, which is so vital in development of mechanical instinct and skill.

Must Educate Craftsmen

The educational value derived from an examination is unquestionable, and our industry should outline a practical examination covering 50 per cent of general mechanical questions, and the rest composed covering proof of familiarity with the makes of cars with which the applicant claims to be familiar. This step would be a big move in gaining the confidence of the public and keep this matter out of the hands of politicians and within the jurisdiction of the industry.

In the solution of the best means of direct education we have a very important problem. Schools, books, and in the larger shops instructors, are important factors and should be encouraged by the industry, but our big problem is, "How can we in the most effective manner, with the least lost motion, disassemble, repair, and assemble a unit or a series of units composing a car?" Lost motion is our biggest enemy to production and is largely the result of our men being forced to follow their own plans in production. Practical mechanical manuals outlining the most efficient plans possible for our men to follow, taking each unit as a series, together with a certain number of operations under each, and listing all special tools, short-cuts, clearances, together with a generous supply of photographs, sketches, and a maximum time limit for each series, must be produced, and changed from time to time as we develop his class of work. It is up to the manufacturer to produce these manuals, but they must be produced from data collected from experiments conducted in actually performing this work, and be strictly practical to be effective. Co-ordination of the factory and dealers' Service Departments is essential in carrying out this work successfully.

Service a Commercial Product

Aside from this educational program there are many other problems we have to contend with before we will reach our goal. There is much to be done in the development of shop equipment, labor-saving devices and the arrangement of our Service Stations in such a way as to make efficient mechanical production possible. One of our toughest jobs is the changing of the attitude of the public so that they will regard Service as a fully developed commercial product.

The sum of many little things done well in all service organizations throughout the country will be a big weapon in this fight, and together with the co-operation of the manufacturer and dealer we will eventually gain the confidence of the public through competency, thus commercializing our product and assisting in creating a larger field for the sale of cars and trucks, because of proper servicing.

CLEARANCE FOR ALUMINUM PISTONS

There has been a great deal of discussion lately as to the proper clearance to fit aluminum pistons. Mr. Butler of the Butler Mfg. Co., Indianapolis, Ind., recently informed the writer that he fitted his aluminum pistons to a close clearance—about 0.0015 to 0.003 in.—depending upon the engine bore. R. H. Brown, service manager of the Mackie Motors Co., Des Moines, Ia., Chalmers dealer, finds that he can attain perfect success with aluminum pistons fitted very close, and that much of the oil fouling difficulties experienced with spark plugs, is overcome with the clearance he advises and uses. He recommends the following clearances:

At upper ring land, 0.024 in.
At center ring land, 0.014 in.
At lower ring land, 0.008 in.
At skirt, 0.0035 in. clearance.

CHRYSLER NOW WITH WILLYS

Detroit — Announcement was made this morning that Walter P. Chrysler, former president and general manager of the Buick Motor Car Co., had become associated with the Willys interests as executive vice-president of the Willys Corp. and Willys-Overland and general manager of all Willys interests.

New York Shows Many New Motor Car Devices

Accessory exhibits at Palace and Armory display unusual proportion of fitments for service work

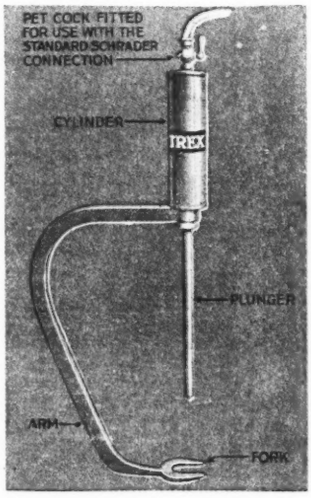
One of the most important developments of the accessory show held in conjunction with the New York Automobile Show last week was the large number of devices shown which had for their purpose the simplifying of service work. MOTOR AGE on this and the following pages shows some of the numerous important accessory and service equipment features displayed.

TREX AIR-OPERATED VALVE SPRING COMPRESSOR

Air pressure is used in this device to compress the valve spring in removing or replacing valves. The cylinder is fitted with a pet cock adapted to take a standard Schrader connection. A plunger fits against the head of the valve and a long arm with forked end extends from the bottom of the cylinder to the bottom of the valve spring. By turning the three way cock air is admitted to the cylinder and the pressure causes the cylinder to lift as the plunger is held against movement by its contact with the valve. The raising of the cylinder lifts the arm and compresses the valve spring. When the cock is closed the spring is held compressed and resumes its original shape as the cock is turned to the open position to permit the air to escape. The device may be operated by either a hand or power pump. It sells for $15.00 east of the Rockies, and $16.00 in the west. It is made by the Trexler Co., 1418 Walnut St., Philadelphia.

COLE VISIBLE GASOLINE GAGE

This gage is placed on the instrument board at any convenient place not occupied by the clock, switch or speedometer. The indicator is a white cylinder which rotates in back of the glass which is painted black leaving a small window through which the cylinder is visible. The designations of "empty" etc., appear in black on the white dial.—Stemco Mfg. Co., Dayton, O.



Trex Air-Operated Valve Spring Compressor

TWO NEW VAN SICKLEN PRODUCTS

A new unit has been brought out by the Van Sicklen Speedometer Co., Elgin, Ill., wherein is combined all the instruments usually found on the instrument board. An oil pressure gage, gasoline pressure gage, ammeter, miles per hour indicator, total trip and season mileage, together with a small clock are mounted as a unit in a glass covered fixture. The clock is self winding, two miles driving of the car being sufficient to wind it for several days. The concern also is showing a neat device for service stations to help in the installation of speedometers on the metal instrument boards of the new Ford models, where it is necessary to cut a circular hole in the board. The tool consists of a steel saw bent into circular form and held by a set screw in a holder that is placed in an ordinary brace. With this outfit a neat hole can be sawed in a few minutes, where ordinarily a hammer and chisel are used. The price of the device is $3.

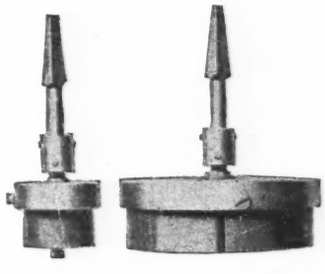
BULLDOG PRESSED STEEL BRAKE SHOES FOR FORDS

Being made of pressed steel instead of a casting, it is possible to make the shoe all in one piece and have sufficient elasticity to expand it with the cam in the usual way. The shoe is fitted with a brake lining and requires no more work to fit than with the ordinary shoe. Fits all models 1909-1920. Packed in cartons of 25 sets; price $2.50 per set of 2.—Republic Auto Parts Co., Long Island City, N. Y.

WILSON REAMER AND JIG FOR FORD CAST IRON BEARINGS

This is a set consisting of a spiral fluted reamer and jig with a pilot for the front and center cast iron bearings. The bearings are placed in the jig which is then tightened with the screw and the jig is held in a vise while the spiral reamer is turned through. The bearing is prevented from shifting and the spiral reamer eliminates chattering at the bearing joints. Price, reamer, $4; jig, $2.50.—K. R. Wilson, 10-16 Lock Street, Buffalo.

Cole Visible Gasoline Gage



Two New Van Sicklen Products

HART-BELL TIRE PUMP

The Hart-Bell pump is of single action type, the cylinder being of 1½ in. steel tubing 20 in. in length. This is screwed into a heavy malleable iron base The plunger rod is of cold rolled steel and a hard wood handle is fitted. The feature of the pump is a conical shaped projection in the base of the cylinder which acts as a forming tool and reshapes the leather bucket at each stroke of the pump. This insures a constant tight fit as the bucket is spread out larger than the circumference of the barrel. The pump is finished by the Parker rust-proof process and its price of $4 includes a 30-in., 5-ply rubber hose with brass screw connection to fit any standard car valve.—Hart-Bell Co., Inc., 1926 Broadway, New York.

WILSON PROPELLER SHAFT REAMER FOR FORDS

To prevent the reamer from skewing this jig is tapered to fit into the universal housing and the hole through the center of the jig serves as a rear end guide to keep the reamer in alignment. The point of the reamer is ground on a long taper and is therefore self-centering. Price $6.—K. R. Wilson, 10-16 Lock Street, Buffalo.

ARNOLD TYPE B OFFSET HAND DRILL AND VALVE GRINDER

This tool is a combination electrically driven hand drill with which can be combined a valve grinding attachment. The drill will hold all tools and bits within its range and can be operated from several different kinds of current, the machines being made of different styles for this purpose. The valve grinding attachment has bits for different style valve heads. Price complete $67.50; valve grinder alone $7.50—Arnold Electric Tool Co., Inc., New Haven, Conn.

INGRAM TRIPLE SEAL PISTON RING

The Ingram is a two-piece ring, each unit of which is furnished with an oil-retaining groove designed to prevent carbon from collecting between the two portions of the ring. The two parts are locked together by a solid lip which is cast as an integral part of one unit. The functions of the lip are triple as it locks over the face, back of the joints and against any upward or downward motion at the joint. As the back of the lip is off-set it prevents the oscillation of one part of the ring in relation to the other. During the process of manufacture the ring undergoes a rotary hammering designed to insure equalized tension and consequent constant contact at all points of the cylinder wall. Price from $1.50 to $2.25, according to size. A set of twelve rings for the Ford engine is furnished at $15.—The Ingram Motor Co., 800 Broad Street, Newark, N. J.

ANDERSON PORTABLE TYPE REELITE

This is a new type of the Reelite with a swivel base to mount on the ceiling. The cord is ordinarily wound up on the reel and pulls up and down with a spring like a window shade. Complete with 25 ft. of cord, lamp guard, socket switch, etc. Price $15.—Anderson Electric Specialty Co., 118-124 South Clinton street, Chicago.

INSIDE HINDVIEW MIRROR

The style B Hindview is intended for inclosed cars and is attached by screws to the roof or frame of the windshield. It is placed in such a position that it enables the driver to see traffic through the rear window. It has a ball joint and is furnished in all standard finishes. A lens mirror is recommended due to the limitation of view through the rear window. Price $3 to $4.75.—Kales Stamping Co., 441-461 Lafayette boulevard, Detroit.

LOWNSBERY EXTENSION HANDLE

A drop forged hook-on handle designed for use with single and double head, open end, straight or S wrenches, gives increased leverage and can be hooked on in difficult places. One end is ground to the form of a screw driver. The No. 1 size with screw driver end is designed to take wrenches up to ½ in. and is furnished unfinished, dull copper plate. Price 75 cents.—Chas. E. Miller, 97 Reade street, New York.

Ingram Triple Seal Piston Ring

OPEN CARS CONVERTED TO CLOSED

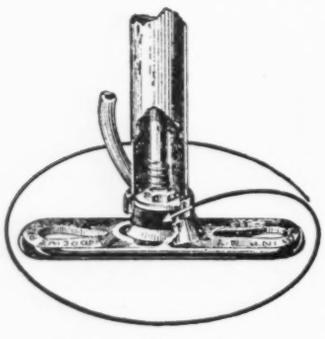
What is known as the Close-Tite for Fords is not a whole top but an attachment that is installed with the regular Ford top to convert the open type car into the closed model. The attachment adds only 37½ lb. to the weight of a car and can be applied in 2 hrs., using only the regular bolts in the automobile. The top after installation is a complete unit and operated in much the same manner as the top of an ordinary roll top desk. The touring type is sold for $48, and the roadster for $33.—Longdin-Brugger Co., Inc., Fond du Lac, Wis.

HOYT HIGH-RATE CELL TESTER

The improved Hoyt cell tester is an instrument designed to indicate the failure of any individual cell of a storage battery. It consists of a hand grip from which protrudes a pair of prods and to which are connected flexible wires with suitable terminals. The tester draws from each cell the full amperage of which it is capable, an ammeter reading telling immediately whether the cell is dead or is not as efficient as its neighbor. The complete outfit is small and light; it is strongly made and sells for $5.—Burton-Rogers Co., 755 Boylston Street, Boston.

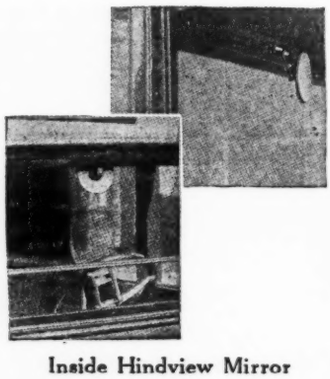
U. S. E. RADIATOR SHUTTER

A radiator shutter that shuts the bottom first and opens it last is made of heavy rubber which is not affected by heat or cold. The shutters are manually operated from the driver's seat. The frame is made of heavy sheet steel finished in black enamel with the control bracket of polished aluminum.—U. S. E. Corp., 8 West Sixty-Second street, New York City.

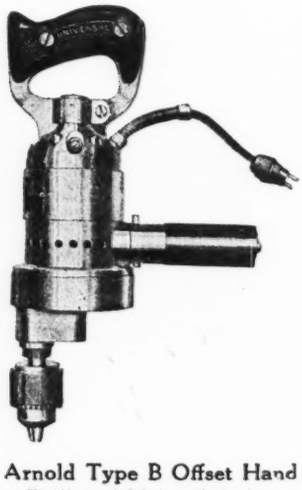


Hart-Bell Tire Pump

Anderson Portable Type Reelite



Inside Hindview Mirror



Arnold Type B Offset Hand Drill and Valve Grinder

REBCO PISTON RING

This ring consists of three pieces, the two outer ones having an interlocking seal at the point of contact and so shaped that when placed together they form a hollow V at the back into which is fitted a heat-treated steel wire expander. This seals both sides of the piston groove by forcing the outer units apart and also pushes the ring outward against the cylinder wall. The recommendation is two of these rings to each piston applied in the first two grooves above the wrist pin. Where only one of these rings is used it should be applied in the first groove above the pin. Price $1.25-$2.25, depending on size.—The Reus Bros. Co., Baltimore.

BULLDOG CLIP

This clip is designed to be used in the charging of storage batteries. It is made of anti-corrosive, lead-coated copper. Connection is made with the wire by a metal clip which also acts as an adjusting device, fitting into corrugations on large clip thus causing a firm hold on the battery terminal. It consists of but two pieces and has no screws or springs. The jaws are saw toothed thus assuring positive contact. It can be adjusted from wire size to 1¾ in. Price 20 cents.—Reliable Mfg. Co., Cleveland.

RELIABLE BATTERY FILLER

This is a frame of metal designed to hold one gallon bottle of either distilled water or electrolyte. The bottle after being placed in the frame is upside-down and the entire bottle and frame can be moved to refill storage batteries in any part of the building. It is provided with a rubber tube and nozzle to carry water or electrolyte to the battery. A clip is attached to one side of the device to hold a hydrometer. A metal tube extends from the base up into the bottle to allow air to enter when contents are being removed. It is finished in black enamel and is substantially built. Price $5.—H. B. Shontz Co., 157 West Fifty-fourth Street, New York.

NATCO COMBINED MAGNETO AND GENERATOR

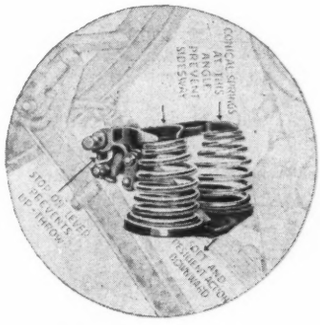
This is a combination machine which produces low tension current to charge the battery at either six or twelve volts and also a high tension current for ignition. One armature answers for both purposes but there are two individual fields and the magnets are of permanent type. The machine is operated at crankshaft speed and regulation is provided by means of a bucking coil. The machine can be fitted to operate four, six, eight or twelve cylinder engines by making slight changes in the distributing system. The whole unit occupies little more space than the average single unit motor-generator.—National Ignition Company, Inc., Irvington-On-Hudson, N. Y.

DE LUXE TRACTOR PLUG

A new type of tractor plug known as the DeLuxe is now being marketed. It is of mica insulator type and its two main features are the bringing down of the central electrode to within a very short distance of the sparking points in its full diameter. The mica being backed up against an inverted cone in which the central sparking point is fitted. The shell electrode is electrically welded in position in such a way as to render it practically impossible to alter the set distance between the actual spark points. Price $4.—The Silvex Co., Bethlehem, Pa.

A NEW HASSLER SHOCK ABSORBER

This is a new Hassler shock absorber designed for use on Ford Sedans and commercial cars. It consists of two spiral conical springs which are made of chrome vanadium steel They are a new adaption of the single spring Hassler shock absorber, eliminating rebound and upthrow and so designed that side sway is minimized. The shock absorber designed for the Ford Commercial Car is heavier than used for the Sedan although they are alike in all other details.—Robt. W. Hassler, Inc., Indianapolis.



A New Hassler Shock Absorber

MARMON TYPE HAYES WHEEL

In this new type of wire wheel which the Hayes Wheel Co. of Jackson, Mich., has brought out, the drive pins are electrically welded into the hub shell which reverses the practice with the other types of wheels made by this company. The company is just getting into production with its special Ford and Chevrolet wheels which are similar in design to its standard product.

BOYCE DELUXE MOTO METER

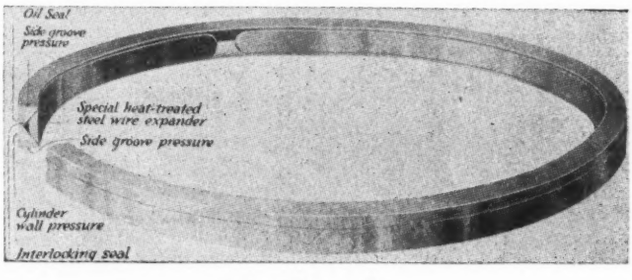
In general principles this new model of Moto Meter is like its forerunners. It differs, however, from those so far produced in the fact that it is provided with a one-half inch thermometer tube. It is also somewhat larger than any of the other passenger car models previously brought out. The DeLuxe is finished in nickel and is designed more particularly for use on foreign cars and the larger American makes. The half inch tube makes the reading of the instrument easy. Production on this new model started January 1. It is made by the Moto Meter Co., Inc., Long Island City, N. Y.

LA-LO LUBRICANT

La-Lo lubricant is said to be free from animal fats, greases, acids, fibre, lye, graphite or water. It has, it is said, no corrosive action and its efficiency is not affected by changes in climatic condition. It is furnished in correct densities for transmissions, differential and universal joints, spring lubrication, grease cups, etc. It may also be used as an external coating on metals exposed to weather and moisture.—La-Lo Chemical Co., 82 Clifford Street, Providence, R. I.

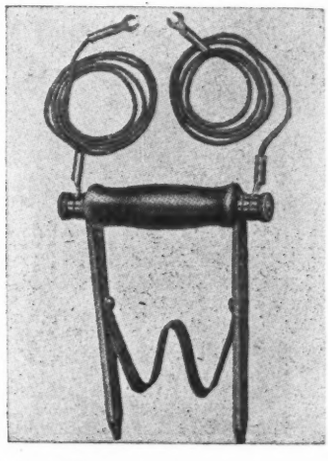
NEW ZENITH CARBURETERS

A new model T has been added to the Zenith carbureter line. One of its chief characteristics is a submerged jet. A three-quarter inch size is made in both vertical and horizontal types for use on motorcycles. The new carbureter is also made up with attachments as a specialty for Dodge cars. The Zenith Carburetor Co. of Detroit, Mich., are the manufacturers.



Rebco Piston Ring

Bulldog Clip



Hoyt High-rate Cell Tester

NATCO HIGH TENSION MAGNETO

An out of the ordinary feature of the Natco Magneto is that the magnets are straight bars instead of being of the horseshoe type. These magnets can be removed by lifting off the top cover which is held on by four screws. Outside of the bar magnets is a brass plate which is packed and tightly fitted to make the machine dust and water-proof. The high tension coil is enclosed in a Bakelite case. The low tension winding is a separate unit and has no connection with the high tension coil. The housing is an aluminum die casting with the pole pieces cast in and steel nuts are cast into this for mounting purposes.—National Ignition Co., Inc., Irvington-On-Hudson, New York.

FAIRBANKS RADIATOR REPAIR OUTFIT

This is a complete outfit for overhauling and repairing radiators and includes all the necessary tools and equipment for not only the actual work but for testing as well. Among the equipment is included dent puller, file, inlet and outlet connection and test plugs, stretch-all, hack saw, soldering iron, pliers, fin spacer, tube spreader, tube cleaner, fin comb, tube regulator, tube cutter, rivet bucker, fin and header bar, cold chisel, tinner's hammer, radiator block, punch and shears. Price $30. Fairbanks Co., Lafayette & Broome Streets, New York.

AMBU UNIVERSAL TEST BENCH

A test bench for every conceivable test on starting, lighting and ignition apparatus is seen in the Ambu Universal Test Bench. Generators may be given operation test at speeds of from 100 to 4000 r.p.m. to determine the current output and the voltage. The cutouts and regulators may also be tested with the generators that go with them. Switches, wiring and accessories provide for different tests under lamp loads, etc., and in case of defective generators the armatures can be tested for open circuits or shorts. The clamp which holds the machine to be tested is universal and may be placed in any position by means of two screws operating at right angles to each other. Connection is made from the variable speed generating mechanism to the instrument by means of a socket which fits over a nut on the shaft. Starting motors can be tested for lock-torque by attaching a 1-ft. lever which operates directly on a spring balance giving a test directly in foot pounds. In addition to the electrical machines the bench provides for testing coils, meters, fuses, lamps, etc.—American Bureau of Engineering, Chicago.

LIGHTNING RIMS

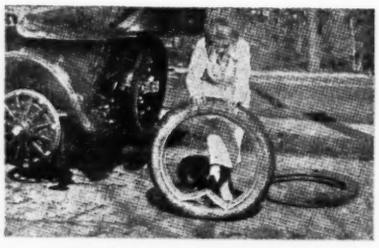
This is a rim consisting of two pieces, each piece having a hinged part at one end. The two hinged parts are designed so that when open they easily fit together and when pressure is exerted they will clamp down thus expanding the rim. The rim is then open, releasing the tire by dropping the rim and tire on the ground after removing from the wheel. It will not open while on the wheel.—Lightning Rim Corp., 5 Columbus Circle, New York.

McCORD 2 IN 1 MANIFOLD GASKET FOR FORDS

This gasket which is designed for use in intake and exhaust manifolds of Ford cars has two flanges, one of which slides into the manifold and the other, into the cylinder port. The later flange is beveled. The construction of this gasket makes it possible to place it in position first. The flange holds it until the manifold is secured. This gasket is the product of the McCord Mfg. Co. of Wyandotte, Mich.

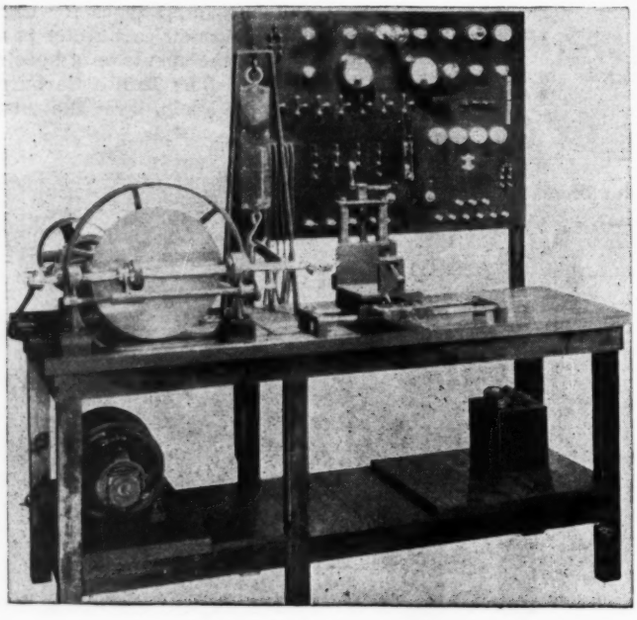
G-E ELECTRIC SOLDERING IRON

This is an electric soldering iron for light and intermittent work built by the General Electric Co., Schenectady, N. Y. The heat unit is of the cartridge type, removable, and is located in the copper tip of the iron thus insuring quick heating. The copper tip is calorized, reducing to a minimum the oxidation of the copper. A guard ring is provided just back of the copper tip which supports it away from the bench when the iron is laid down. A protective handle of heavy wire is provided, giving a certain degree of flexibility found convenient when working in corners. This is furnished in various sizes weighing from 1½ to 3 1-7 lb.

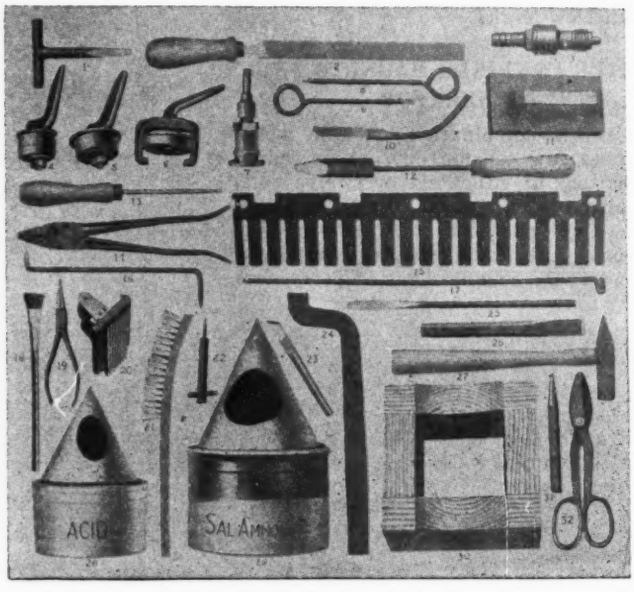


Lightning Rims

Natco High Tension Magneto



Ambu Universal Test Bench



Fairbanks Radiator Repair Outfit

FAIRBANKS ENGINE OVERHAUL STANDS

These stands are bolted to the floor and have a universal head to which the engine is attached by a heavy spindle and nut attached in between the second and third cylinders. One of these stands is made for Fords and the other for Dodges, and either style may be had with a swinging head which will hold the engine in an upright position, at 45 deg. or in a horizontal position. This swinging device is $30 extra. With either style the engine can be swung in a circle to eight different positions and locked with a quick action catch. Price $35; $65 with swinging head.—Fairbanks Co., Lafayette & Broome Streets, New York.

MERRITT POWER AND LIGHT PLANT

The 1½ k. w. Merritt electric light and power plant is a single unit machine, all the complaints being mounted on a single base plate. The power plant is a single cylinder engine 3x4 in. operating at a speed of 1200 r.p.m. and rated at 3¼ hp. This is directly connected to a four pole generator with a rating of 32 volts. The switchboard is mounted on the generator directly above the commutator. This switchboard contains the usual starting and stopping switches and also an ampere hour meter.

The plant is of the semi-automatic control type which stops automatically when the battery has reached its full capacity. It does not start automatically however, and must be started by hand.

The engine is of the L-head type with a counter balanced crankshaft and drop forged connecting rod. The general design follows automobile practice. Lubrication is by a gear pump in the crankcase which incidentally forms the oil tank and a breather is used as an oil filler. A governor of the centrifugal type is mounted on the right side of the camshaft in a housing and runs in a bath of oil. The carburetor is a ¾-in. Schebler but a Kingston can be had if desired.

Cooling is by thermo-syphon system with a cellular radiator located between the generator and the engine. A condenser is used in the return pipe to prevent escape of steam and the engine flywheel has fan shaped spokes to draw the air through the radiator and expel it through openings cast in the flywheel housing.

The batteries are rated at 32 volts, 88 ampere hours capacity and Willard, U. S. L. or General Lead are optional.

A pulley on the end of the generator shaft permits taking power for driving accessories or machinery within the range of the outfit. The weight is 425 lb. excluding battery and wiring. Price $615. S. W. Merritt Co., 699 West 133d street, New York.

Stewart Model 160-A Speedometer

SIMMS TWO UNIT STARTING AND LIGHTING SYSTEM

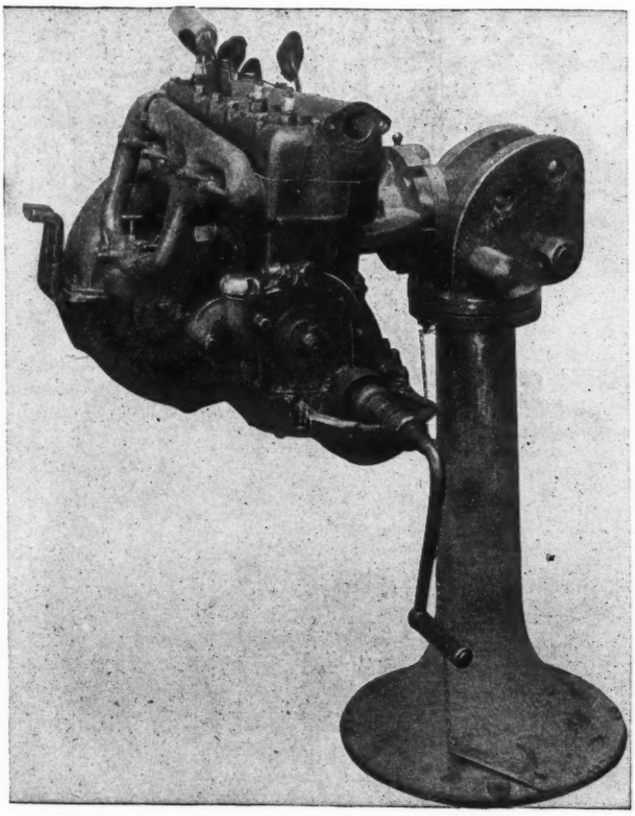
A new two unit starting and lighting system has been brought out by the Simms Magneto Co. of East Orange, N. J. It is a 6 volt system with a four pole, shunt wound, cylindrical generator, 5 in. outside diameter. Third brush regulation is employed. The starting motor is of the six pole type and also has an outside diameter of 5 in. It is fitted with Bendix drive and is capable of developing a starting torque of 14 lbs.

STEWART MODEL 160-A SPEEDOMETER

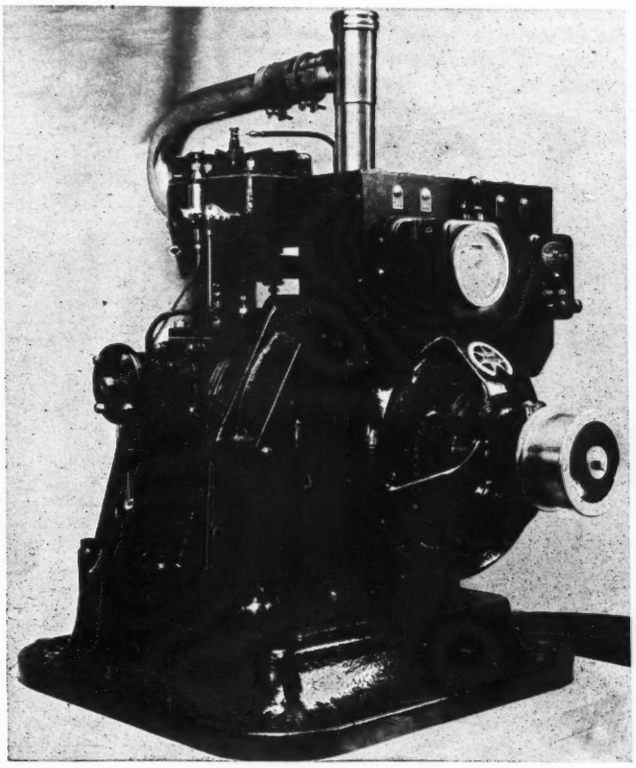
This speedometer has been designed for Ford cars with built-in starters. It can be easily installed on the regular Ford instrument board without cutting around hole. It is of 60 mi. capacity rotating speed dial, 100,000-mi. season and 100-mi. trip odometer and sets to any tenth of a mile. Beveled odometer openings render the figures easily read from the driver's seat, the figures are large and plain and the instrument is fully jewelled. Tungsten steel magnets are used and the black enamel flange matches the regular Ford switch-plate. Price, complete with driving equipment, $12.50. — Stewart-Warner Speedometer Corp., Chicago.

WILSON STEERING SPINDLE BUSHING MILL FOR FORDS

After the bushings are replaced in the steering spindle of the Ford they are evenly and quickly cut down to the correct size with this combination end mill and arbor so that there will be a perfect fit. One end mill and arbor serves to reface both flange bushings and both faces on worm axles. Price $5.—K. R. Wilson, 10-16 Lock Street, Buffalo.



Fairbanks Engine Overhaul Stands



Merritt Power and Light Plant

CURTIS AIR COMPRESSOR

This is a new style air compressor made by the Curtis Pneumatic Machinery Co., St. Louis, Mo. It is of the portable type and has a contained reservoir because of the special construction of the air compressor crankcase and the finned cylinder for cooling the air supply will be free of oil and cool. A flexible belt drive is used that has an adjustable feature for taking up the wear in the belt. This model is made in several sizes, the ¼ and ½ hp. models being particularly adapted to small service stations and the larger sizes for stations doing a more comprehensive line of repairs. With the larger models sufficient air is furnished so that the air hose can be used for cleaning machinery, electrical equipment, upholstery and tops and also for spray painting outfits. The outfit is mounted on large wheels and if desired these can be had equipped with rubber tires.

LUTHY NON-BREAKABLE HYDROMETER

The Luthy hydrometer shown in the illustration is of the non-breakable type because the parts are made of a very fine grade of celluloid which is not affected by acid and has the transparency of glass. The hydrometer if subjected to a lot of rough usage is very easily broken. This one therefore serves a real purpose. It sells for $1.25 and is made by the Luthy Hydrometer Company, 97 Woodward ave., Detroit.

cap is enclosed with a large glass protector so that the readings are visible from both sides. The readings run from freezing to boiling. Can be attached to any car by drilling 11-16 in. hole in the raditaor cap. A nut on the bottom of the cap holds the device in place. It is made by A. E. Moller, 261-265 Sumpter street, Brooklyn, and costs $7.50.

RIVES ACCELERATOR PAD AND HEEL REST

This is an adjustable device to be attached to the floor by means of a hinge. The upper part of the pad rest upon the accelerator pedal so that a pressure on any part of the pad will affect the acceleration. It can be lengthened by means of a screw bolt located in the center between the heel rest and accelerator pedal. It is equipped with a guide rim around the heel rest thus preventing the heel from slipping. A rubber pad is clipped to the device to keep the foot from slipping. There are two wood screws holding the device in place at the hinge. Price $1.50.—Geo. H. Rives Mfg. Co., Inc., 2187 Woolworth Building, New York.

STERLING JACKS

While these jacks are not new the inside construction and the materials have been somewhat changed. One of the features is the single acting automatic lowering which is operated on the down stroke of the handle regardless of whether the load is raised or lowered. The direction of movement is controlled by the position of the tripping lever and when the handle is not operated the pawls automatically lock.—Republic Auto Parts Company, Long Island City, N. Y.

H. I. WIND DEFLECTORS.

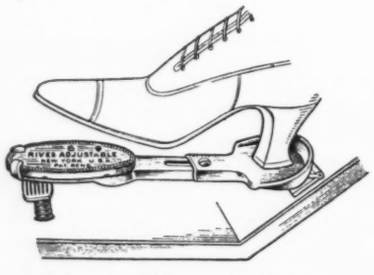
The H. I. wind deflector is intended to bring more air into the car in hot weather. By simply moving the deflector to a new position dust may be excluded, and it is all done by a simple twist of the wrist. When used to deflect the onrushing air currents, the device causes wind and dust, rain or snow, to sweep around the outside of a car. Attachment can be made to the windshield in but a few seconds.—James Martin, 134 West Fifty-second Street, New York.

ONE-PIECE BETHLEHEM SPARK PLUG

A new Bethlehem spark plug of one-piece construction has been added to the line. Both insulator and shell are of sturdy dimensions, the former is of porcelain. The plug is made in ⅞-18, ⅞ long and ½ in. long. It is also made in special types for individual cars of leading makes. Price $1.

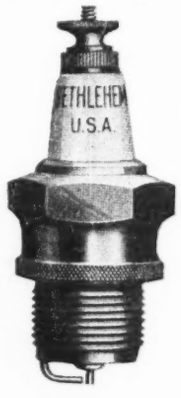
QUAKER STATE OIL

Quaker State medium oil has a high flash test and an ignition point of 450 deg. Fahrenheit and is known as the Quaker State medium flash, resulting from tests made by the manufacturers, Phinny Bros.' Company, of Oil City, Pa.

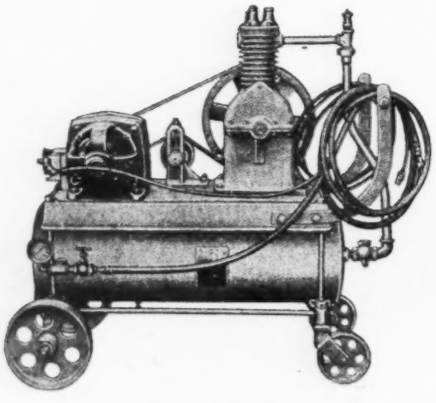


Rives Accelerator Pad and Heel Rest

H. I. Wind Deflectors



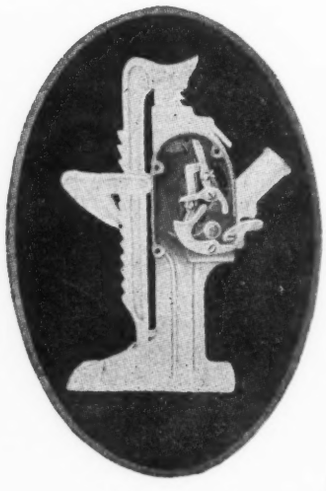
One-Piece Bethlehem Spark Plug



Curtis Air Compressor

Luthy Hydrometer

The Autostat Radiator Signal



Sterling Jacks

U. S. L. ARC WELDERS

This arc welder is a variable voltage machine for generating 200 amperes or less direct current at the voltage range required for electric arc welding. The equipment is intended for single operator use and consists of a motor-generator, a switch, meter panel, arc stabilizing reactor, electrode holder, face shield and for portable use a truck and cable reel with two 50-ft. lengths of flexible cable. To vary the current both voltage adjusting rheostat and current adjusting switches are provided, the latter having four points so that any current from 50 to 200 amperes may be used. If it is desired to take current from direct current mains, at 100 to 125 volts a convertor type having the functions of a motor and generator but with only one armature, one commutator and one set of field coils is used.—U. S. Light & Heat Corp., Niagara Falls, N. Y.

RELIANCE DOUBLE DISC WHEEL

The demountable parts of this wheel comprise an inner disk, outer disk and felloe band. The disks are on piece steel stampings with integral rims. The felloe band is a one piece rolled steel channel. A malleable iron hub is used and it is fitted with six steel driving pins. The malleable iron hub cap is fitted with an automatic locking device. The special valve stem is fitted with standard Schrader valve and projects through the outer disk. A series of ten bolts lock the two disks and felloe together. For the removal of a tire the bolts are loosened and the disks separated. The wheels have tapered mountings which eliminate adjustments. The rim sections conform to the Tire and Rim Associations standards. The wheel is the product of the Reliance Wheel Co., Youngstown, Ohio.

NEW KELLOGG PUMPS

A hand pump of the single barrel type designated as No. 21 and a stationary garage pumping outfit are new additions to the line of the Kellogg Mfg. Co. of Rochester, N. Y. The hand pump has a cylinder of highly polished, heavy brass tubing 20 in. long by 1½ in. in diameter which screws into a wide, flat foot piece of steel. A large ebony finished handle and 36 inches of air hose with thumb lock connection are two of the features. The cup leather on the plunger is self lubricating. The pump retails for $4.50.

The stationary pumping outfit is similar to the company's portable Model EM-241 which has been on the market for about a year but it is mounted on brackets and is fitted with an automatic starting and stopping device which insures the maintenance of a uniform pressure of air in the tank. All moving parts are completely enclosed. The air cooled pump has a single cylinder fitted with a long piston which has carefully fitted rings. Poppet type valves are used. The tank is 12 in. in diameter by 33 in. long and is designed for a working pressure of 200 lbs. to the square inch. A one-half horsepower electric motor drives the pump. The outfit is provided with 15 ft. of heavy wire-bound hose, Schrader automatic inflating valve and pressure gage. The price with direct current motor is $220 and with alternating current motor $230.

HEMPY-COOPER REBABBITTING LADLE AND JIG

An improvement has been made in the design of the Hempy-Cooper rebabbitting outfit, this improvement being a combination of a ladle with the regular outfit. The hot metal is poured into the ladle and the flow is controlled from the ladle to the bearing by the plunger which opens and closes the valves. This is said to do away with air holes in the bearings and also to eliminate the necessity of preheating the bearings. In addition to this the babbitt that goes into the bearings is purer because the scum rises to the top and stays in the ladle. Price complete, $152.50.—Fairbanks Co., Lafayette & Broome streets, New York.

WILSON PROPELLER SHAFT BUSHING FACER FOR FORDS

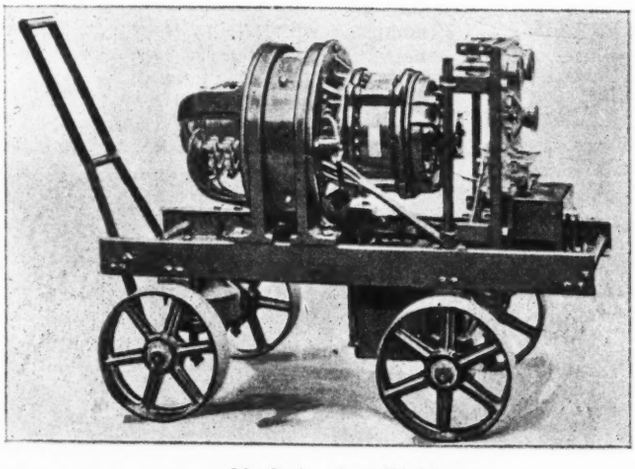
If the Ford propeller shaft bushing is not exactly the right thickness on the face this end mill will cut down the bushing flange quickly and evenly so that the universal joint will not have to be forced into place. Price $5.—K. R. Wilson, 10-16 Lock Street, Buffalo.

MANLEY PORTABLE WORK BENCHES

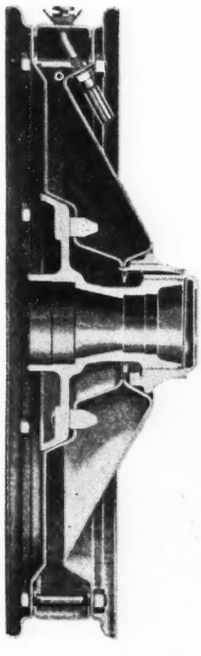
A bench designed so it can be moved to any part of the garage, is equipped with four wheels upon two of which there are locks so that the bench is immovable when once locked. It has a vise and a bar underneath which can be dropped making the bench solid when heavy work is being done in the vise. It is substantially constructed with steel and wood with oak top and roller bearing casters. Furnished in two sizes, No. 201, 44 in. long and 13 in. wide, weighing 150 lbs. Price $36. No. 202, 64 in. long, 20 in. wide and weighs 300 lbs., price $52, vises are extra.—United Engine & Mfg. Co., Hanover, Pa.

SEARS-CROSS DOOR LOCK

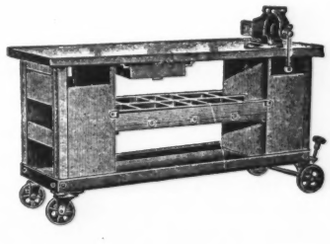
The main feature of this lock is an expanding latch designed to prevent rattling to insure against doors opening accidentally, to overcome any difficulty in opening or closing the door and to take up wear automatically. By the use of fiber stops which are non-yielding the door is tightly held, the necessary holding pressure being supplied by the lock itself. If desired, rubber can be used as stops but not as pressure pads. The operation of opening or closing doors fitted with the Sears-Cross lock requires only a gentle push or pull as there is no friction to be overcome between the latch bolt and the striker such as would be the case if rubber pressure pads were used.—Sears-Cross Co., Bush Terminal, Brooklyn, N. Y.



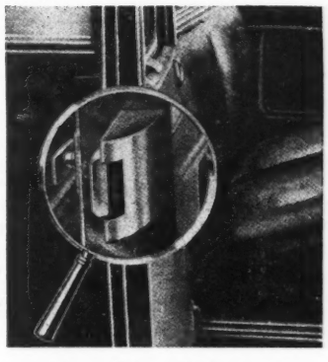
U. S. L. Arc Welders



Reliance Double Disc Wheel



Manley Portable Work Benches



Sears-Cross Door Lock

CRONK SLIDING GEAR SET FOR FORDS

The Cronk Simplex Sliding Gear Transmission for Ford cars and trucks has three forward speeds and can be installed on any model. In the case of the old types the design allows for the installation of an electric starter in the same manner as in the case of the 1920 Fords. The equipment is strongly made, having oversized nickel steel gears and a drive shaft foot brake at the rear. Installation is a relatively simple matter. —E. D. & A. F. Cronk, Inc., Utica, N. Y.

VACUUMETER

The vacuumeter indicates the proper operation of the vacuum system and consists primarily of a diaphragm which is moved by the suction of the vacuum system which causes the shutter to change from white to red. The same movement moves the three readings showing "season," "total," "trip total" and "gallons left in the tank," adding to the first and substracting from the tank reading showing that there is less gasoline in the tank than before. It is designed to place a check on the importance and factor of running cost and the amount of gas being used. It is mounted on the dash that has but one connection with the vacuum feed system, this a copper tube. Price $18.50.—Vacuumeter Sales Corp., Knoxville, Tenn.

E. R. P. SPARE RIM CARRIER

This spare tire and rim carrier has a three-clip attachment and can be used to hold either one or two additional tires to any existing tire carrier. The clips slip on and off quite easily by simply tightening or loosening the bolt and both tires can be removed without detaching the carrier. Price $3.50.—Sedgwick Sales Co., New York.

PHELPS DEMOUNTABLE WIRE WHEEL

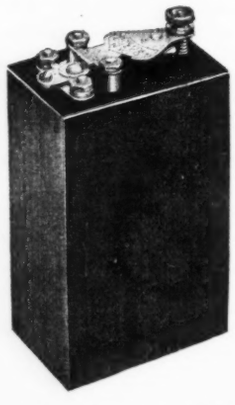
The features of the Phelps Demountable Wire Wheel are a rear inner hub having two straight and one taper bearing, the teeth in the gear drive being machined to very close limits and the locking device being attached to the end by means of bolts. The front hub is obviously without gear drive and has no threads, hence all that is necessary is to simply slip the wheel into position and lock it there. The front hubs are interchangeable and may be used on either side of the car. Both front and rear hubs are cast in special analysis steel. The wheel itself is of conventional type. —Phelps Mfg. Co., Columbus.

NEW YORK SUPER-COIL UNITS FOR FORDS

There are several features to these coil units for Fords, one of which is the provision for increasing or decreasing the tension of the armature spring so that the correct coil adjustment can be made by the owner for the particular magneto in the coil. In addition to this there is the conventional thumb-nut adjusting screw to compensate for wear on the contact points which are of Tungsten. The cases are mahogany and the top is red for identification. The units are damp-proof. Price $4.—New York Coil Co., 338-340 Pearl street, New York.

PEP; WATER MIXED GRINDING COMPOUND

Pep is a water-mixed compound for use as an abrasive in the operations of valve-grinding and piston-lapping. It is non-magnetic and free from emery, glass or metal dust and it is further stated that it will, when properly used, grind an ordinary valve without the necessity of refacing in from 20 to 30 sec. It is put up in 4, 8 and 16 oz. cans.—Worcester Abrasive Co., Worcester, Mass.



New York Super-Coil Units for Fords

NEW BROWN LIPE TRANSMISSIONS

The new Model 60 truck transmission has four speeds and is of the main frame type designed for trucks of from 5 to 7 tons. It has a detachable power take-off which drives from the second speed lay shaft gear. This take-off is enclosed in a separate housing which bolts to the side of the gear case and can be removed as a unit when desired. A plate is provided to cover the aperture in the gearcase when the take-off is not being used. On the opposite side of the gear case is a smaller aperture for the mounting of a pump when the transmission is used with pneumatic tired trucks. This transmission has gears with 1½ in. faces and 6-8 pitch. The reduction on low is 5.35 to 1. To this transmission side pull rods are fitted.

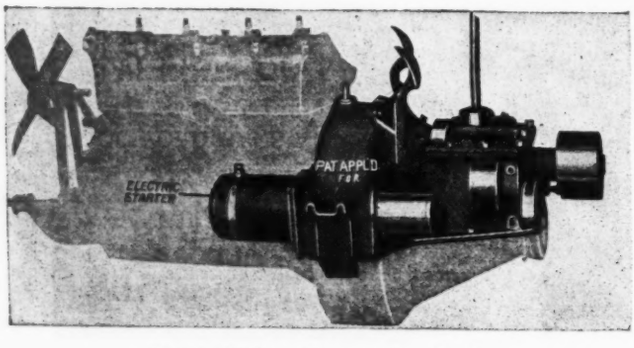
Model 50 has overhead shift. It is also of the main frame type but has an inbuilt power take-off. The gears have 1⅛ in. face. There are four speeds with a reduction of 5.35 to 1 on low.

MARKO STORAGE BATTERY

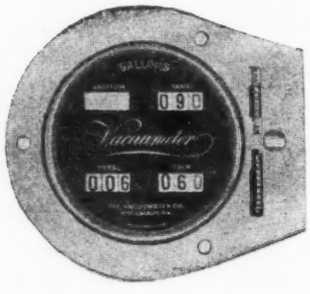
Among the features of this battery are splash covers which slip into the basis of the posts to indicate the proper electrolyte level, octagonal nuts threaded to fit the threads on terminal posts which can be made tight with the fingers or wrench, and separators which are made of southern cypress and are slotted to avoid internal troubles. The cells are not sealed in the cases but are held in place by a molding which can be removed and the cells lifted out.—Paul W. Marko Co., Inc., 1402 Atlantic Avenue, Brooklyn.

F-B TEST STAND FOR FORD LIGHTING AND STARTING SYSTEM

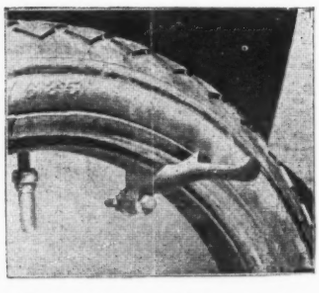
This is a test stand for making thorough and complete tests of the F-A generator and the F-A motor on Fords and for locating and repairing any troubles or defects. It is made by Fairbanks Co., Lafayette & Broome streets, New York. Provision is made for regulating the third brush and the motor speed and current draw of the generator is shown as well as the torque of the motor. Any shorts or grounds are shown by the tell-tale and test points. Price $350, complete with wiring, switches, battery, battery box, test points, etc.



Cronk Sliding Gearset for Fords



Vacuumeter



E. R. P. Spare Rim Carrier

VELVET RECOIL DEADENER

This device is designed to absorb shocks by checking spring recoil. It consists of (a) a stationary cam attached to a pivot bolt (b) which is a part of the bracket fastening the deadener to the frame of the car. A drum (e) turns on this spivot bolt. (c) is a spring which is permanently fastened to the inside of the drum at (d). As the deadener operates as fast as the car spring can vibrate the strap is kept taut all the time, thus preventing sudden jerks when the car passes over several road bumps in succession. A spring on the opposite of the drum brings the latter back to normal position and winds up the strap, the cam doing the actual work as the action of the spring is against it. Made for light, medium, heavy and extra heavy cars. Price $18.90 per pair either front or rear. A smaller and simpler type is made for the rear of Fords and Chevrolet 490. The former sells at $11 per pair and the latter at $12.60.—Blackledge Mfg. Co., 341 East Ohio street, Chicago.

ALBERTSON FORD TOOL SET

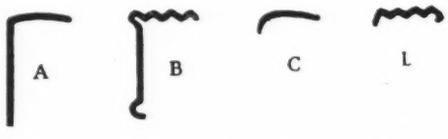
The Albertson & Co., Sioux City, Ia., has recently announced a set of valve tools for the Ford car that simplifies repairing on the Ford engine. The set is particularly adapted for Ford engines and other of similar construction and comprises a valve grinder, a valve seat reamer, a valve refacing tool, a valve grinding compound, both course and fine and a valve spring. The grinder is of the type that gives a reciprocating motion to the valve by turning the handle steadily in one direction.

It automatically advances the valve periodically on its seat by alternating a full turn in one direction and a three-quarter turn in the opposite direction. Thus it gradually completes the circle and insures an even grind on the full circumference on the valve seat. The reamer is of the type that has an extended shank which fits into the valve stem guide and so gives perfect alignment when reaming out the valve seat. The refacing tool is operated like a miniature lathe. A valve spring is also furnished that is placed in the valve chamber and on the valve stem, to enable the valve to be lifted during the process of grinding.

STARTER STEEL RING GEAR

The Starter Steel Ring Gear made by the Kent Auto Parts Co., Denver, Colo., is made for replacement of the cast iron teeth on the flywheel. Many times a motorist experiences trouble due to the breaking off of the teeth on the flywheel. With this replacement band which has cut steel teeth on it the old cast iron teeth are cut off and the band secured to the flywheel.

Albertson Ford Tool Set



Unique Moldings

THE F. W. S. PISTON RING

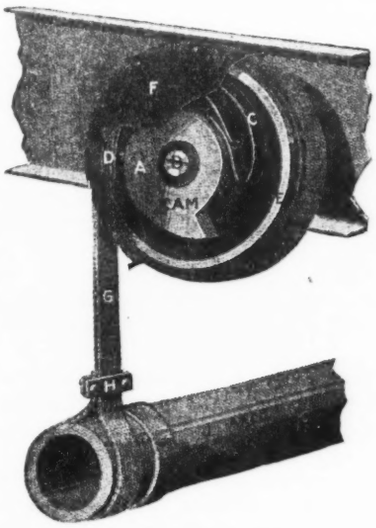
This is a one-piece ring of concentric type. It has a four-way lock which is so designed that it will remain tightly sealed regardless of the direction in which pressure is applied. Lock remains sealed whether the ring is expended to the maximum of the cylinder bore or contracted to the minimum. The ring is carefully machined and ground and is made in sizes to fit all makes of cars. It is the product of the F. W. Stewart Mfg. Corp., 345 West Austin Avenue, Chicago.

UNIQUE MOLDINGS

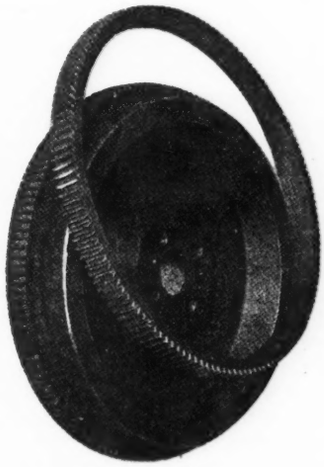
Moldings for repairing worn running boards and floor boards are supplied in eight different styles and in lengths of 5 and 10 ft. These moldings give an old car a very much improved appearance especially with a painting job. Prices depend on size, metal and quantity.—See Spiro Mfg. Co., 68-72 East 131 St., New York.

CONNECTICUT ELECTRIC CLOCK

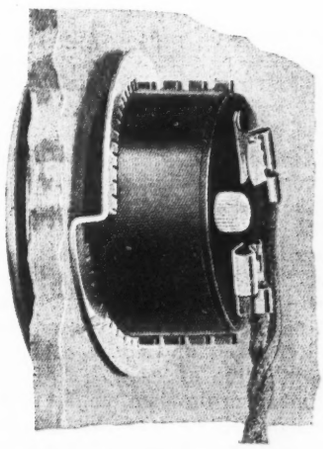
The Connecticut clock has a seven-jeweled movement and its electrical mechanism is extremely simple. When connected with the storage battery a fine coil spring is automatically tensioned to give the movement the exact power necessary for a proper beat of the balance. At it is replenished electrically every minute the spring tension is constant, thus insuring a minimum of wear and a consequent time-keeping accuracy. The terminals on the back of the case are of spring type in order that there may be no possibility of the connections jarring loose. The body of the clock is dust proof and the instrument is held in position by a special locking ring. A fibre washer at the back of the case prevents short circuit and current consumption is extremely low. Various finishes are offered and any voltage from 4 to 12 can be furnished. Price $18 with the necessary wire and instructions; with luminous dial hands, $2.50 extra. —Made by Connecticut Clock Co., Hartford, Conn.



Velvet Recoil Deadener



Starter Steel Ring Gear



Connecticut Electric Clock

Nebraska Makers Rules for Tractor Tests

Cornhusker State Adopts First Official Rules Governing Trials of Farm Machines

1. **Outline of test.** The board of tractor test engineers has adopted the following outline to be followed in the official tests under the law:

The complete test will consist of the following parts:

(a) Drawbar work at from 1/3 load to full load for twelve hours. This test gives opportunity for the tractor to "limber up."

(b) Brake horse power test at rated load and rated speed for two hours. This test will show whether the tractor will carry its rated load on the belt; also show fuel consumption at rated load.

(c) Brake horsepower test at load varying from maximum to no load with all engine adjustments as in test (b) for one hour. This will show fuel consumption and speed control on varying load.

(d) Brake horsepower test at maximum load for one hour with governor set as in test (b) and carbureter adjust-

with governor set as in test (b) and carbureter adjusted for most economical operation at one-half load. This will show fuel consumption at one-half load.

(f) Drawbar horsepower test at rated load for ten hours. This will be made on a half-mile cinder track and will show whether the tractor will carry its rated drawbar load continuously; also show fuel consumption on drawbar work.

(e) Brake horsepower test at ½ load for one hour to give maximum power. This will show the maximum horsepower of the tractor on the belt.

(g) Maximum drawbar horsepower test. This test will be a series of short runs with an increase of load for each run until the engine is overloaded or the drive wheels slip excessively.

(h) Miscellaneous. This may include investigation of work on inclines, turning radius, effectiveness of brakes, or any other feature of the tractor which may seem to require special observation.

(i) Tractors will be under observation for endurance throughout the complete test as outlined above.

2. **Numbering official tractor tests.** Each complete tractor test will be given a number (Arabic numeral being used) and these numbers will run serially from 1 upward, in the order in which tests are started. Each part of the test will be numbered with the serial number of the complete test of which it is a part and the letter used for that part of the test in the "Outline of Test." For instance, the "limbering up" run on the first tractor tested will be test No. 1a; the ten hour drawbar test on that same tractor will be test No. 1f. In case it is necessary for any reason to repeat any part of a test, the letter "R" will precede the original test number; that is the ten hour draw bar test on the first tractor if repeated would be numbered R1f. If repeated a second time the number would be RR1f. When two or more dynamometer charts are used in one drawbar test the charts will be numbered serially with arabic numbers following the test number and separated from the test number by a hyphen; for example 1f-1, 1f-2, 1f-3, etc. The successive runs in test (g) will be numbered 1g-1, 1g-2, 1g-3, etc. If it is necessary to repeat the whole series of runs in test (g) the number will be R1g-1, R1g-2, etc. If a complete test is repeated, it will be given a new serial number.

3. All tractors will be delivered for test to the University Farm, Lincoln, Nebraksa.

4. **Fuels.** All tests will be made on lowest grades of fuels sold throughout Nebraska on which the tractor will operate; that is, if the manufacturer claims that his tractor will operate only on gasoline, it will be tested on the lower grades of gasoline sold within Nebraska. If the manufacturer claims that the tractor will operate on two or more distinct fuels (for instance, gasoline and kerosene) it will be tested on the least volatile of these fuels, that is, kerosene. If the manufacturer so desires, the tractor will also be given test (b) Par. 1 on the other fuel or fuels on which the tractor is claimed to operate.

Fuels will be supplied by the University and charged to the manufacturer at current prices.

All fuels will be tested and measured in accordance with Par. 9.

5. **Lubricants.** Manufacturers will be asked to specify the kinds and grades of lubricants to be used on the different parts of each tractor tested. These lubricants will be supplied by the University and charged to the manufacturer at current prices.

All engine oils will be tested and measured in accordance with Par. 9.

6. **Manufacturers' Representatives and Tractor Operators.** The tractor manufacturer will furnish an ample number of trained operators with his tractors when they are being tested. During the "limbering up" run (a) Par. 1, the manufacturer's operator will operate the tractor and give necessary instructions to operators employed by the University who will have charge of the tractor in tests (b), (c), (d), (e), (f), (g) and (h) Par. 1. The operator employed by the manufacturer should be present at all times during the test to see that the tractor is operated according to instruction and that the test is fair in every way to the tractor.

Representatives of manufacturers are welcome to be present during the test but none of them will handle the tractor nor any testing equipment during the test excepting by authority from the engineer in charge or some person designated by him

If the manufacturer has more than one representative present during the test, he shall designate one of them as his official representative.

7. **Bell Tests.** These tests will be made with a Sprague electric dynamometer of 150 hp. capacity. This dynamometer will be driven through an extension shaft mounted on SKF ball bearings and carrying a paper pulley 10 in. in diameter and 12 in. face. (Manufactured by the Rockwood Mfg. Co., Indianapolis, Ind.)

The following belts are supplied by the University:

One 5-in. single first quality leather belt, 50 ft. long.

One 6-in., 5-ply "glide" friction surface rubber belt, 60 ft. long. (Manufactured by Goodyear Tire and Rubber Co., Akron, Ohio.)

One 8-in., 4-ply "Klingtite" friction surface rubber belt 80 ft. long. (Manufactured by Goodyear Tire & Rubber Co., Akron, Ohio.)

One 10-in., 5-ply "Candy" stitched canvas belt 100 ft. long. (Manufactured by the Candy Belting Co., Baltimore, Maryland.)

The tractor manufacturer may select any of the belts mentioned above, or may supply his own belt if he desires to do so.

Tractors will be given credit only for the power delivered to the dynamometer.

8. **Drawbar tests** will be made on a half-mile cinder track. This track is not level but has several short grades none of which is greater than 3½ per cent. The condition of the track will be kept as nearly uniform as possible by drag-

Much has been written about the prospect in many states of requiring official tests of tractors which are to be sold within their borders. A great deal has been guesswork, but Nebraska has taken the lead in setting an official test which must be undergone by every tractor company which expects to do business in that state. The rules, which are given in full in the accompanying article, are published by Motor Age in the belief that they will be of value to tractor makers and dealers not only in Nebraska but in many other states which plan to adopt official tests for these machines.

ging, rolling and sprinkling when necessary.

To provide a drawbar load which can be kept constant during a test and which can be adjusted to suit different sizes of tractors, a dynamometer car of loading machine will be used. This loading machine will consist of an Illinois tractor chassis with a Sprague electric generator mounted in place of the engine and driven by power from the drive wheels of the machine as it is pulled by the tractor under test. The drawbar load can be adjusted by adjusting the electric load taken from the generator. This loading machine will have a capacity up to about 30 drawbar horsepower. For larger tractors, additional loads will be pulled behind the loading machine.

The drawbar pull will be registered by a Gulley traction dynamometer (manufactured by the Burr Co., Champaign, Ill.) which will be attached between the tractor and the dynamometer car.

9. **Measuring Fuel, Oil and Water.** The quantity of fuel and oil used in each part of the test (except a. Par. 1) will be determined by weight and the quantity reduced to gallons at 60 deg. Fahr. For brake tests a tank will be placed on a scale and set at the same height as the tank on the tractor. Fuel will be drawn from this tank on the scale during the tests.

For the 10-hour drawbar test either of the following methods may be used. First method: Fill the tank to a measured level at the beginning of the test. Fill to the same level at the end of the test, weighing the fuel put in. Second method: Drain the tank at the beginning of the test. Fill the tank, weighing the fuel drawn out. One of these methods may be more convenient and accurate with some tractors and the other method with other tractors.

A sample of each order of fuel received will be tested at the Mechanical Engineering Laboratories.

The quantity of oil used will be determined with standard gallon, quart and pint measures, or by weight when more convenient. The quantity used in the complete test (see Par. 1) will be determined as accurately as possible. In most cases it will not be practicable to try to determine the amount of oil used in each separate part of the test. Samples of all engine oil used will be tested at the Mechanical Engineering Laboratories. In the case of recirculating oiling systems the oil will also be tested at the end of the tractor test or when the oil is drained.

Quantity of water used in each part of the test (except a. Par. 1) will be determined by measuring the height of water in the radiator or tank at the beginning of the test and filling to the same level at the end of the test weighing the water added. If necessary in order to secure accurate results, the water added will be heated to the same temperature as the water in the radiator.

Rules and Detailed Description of Test

Test (a)

10. **"Limbering up run.** The principal object of this run is to take ou the stiffness likely to be found in a new machine. Record of any repairs or adjustments made and of oil consumption, loads carried and actual running time will be kept by an observer.

Tractors in this run will be used to pull drags and rollers in maintaining the cinder track and for any other drawbar work that may be convenient.

The loads pulled will be: Approximately 1/3 load for approximately four hours, approximately 2/3 load for approximately four hours and approximately full load for approximately four hours, a total of approximately twelve hours actual running time.

Test (b)

11. **Brake horsepower test at rated load.** The object of this test is to show whether or not the tractor will carry continuously its rated load on the belt and to show fuel consumption at rated load.

The tractor will be given as nearly as possible its rated load. The governor will be set to run the engine at rated speed. If the tractor will not carry its rated load at rated speed, this test will be made at the greatest load it will carry at rated speed.

The test will begin after the temperature of the cooling fluid has become constant. The duration of the test will be two hours continuous run with no change in load or in tractor adjustments.

The tractor will be operated by an employe of the University.

Test (c)

12. **Brake horse test at varying load.** The object of this is to show fuel consumption and governor control when the load varies.

All adjustments are to be as in test (b) Par. 11.

The loads will be as follows:

Ten minutes at rated load (or load carried in test (b) Par. 11).

Ten minutes at maximum load.
Ten minutes at no load.
Ten minutes at ¼ load.
Ten minutes at ½ load.
Ten minutes at ¾ load.

The total running time is one hour and the test will be made without any engine stop or any change of tractor adjustments.

The tractor will be operated by an employe of the University.

Test (d)

13. **Brake horsepower test at maximum load.** The object of this test is to determine the greatest load the tractor will carry on the belt with the governor set for rated speed at rated load.

The brake load will be increased until the horsepower developed is greatest. The governor will be set as in test (b) Par. 11. The carbureter will be readjusted if necessary to give maximum power.

The test will begin after the temperature of the cooling fluid becomes constant. The duration of the test will be one hour continuous run, with no change in load or tractor adjustment.

If the speed should change during the test enough to indicate that conditions had not become constant when the test was started, the test will be repeated with the necessary change in load.

The tractor will be operated by an employe of the University.

Test (e)

14. **Brake horsepower test at half load.** The object of this test is to determine fuel consumption at half-load.

The brake will be set to give one-half of the torque developed in test (b) Par. 11.

The governor will be set as in test (b) Par. 11. The carbureter will be readjusted if necessary to give most economical operation at this load.

The test will begin after the temperature of the cooling fluid has become constant. The duration of the test will be one hour continuous run with no change in load or tractor adjustment.

The tractor will be operated by an employe of the university.

Test (f)

Drawbar horsepower test at rated load. The object of this test is to show whether or not the tractor will pull its rated drawbar load continuously and to show fuel consumption on drawbar work.

The test will be made on the cinder track described in Par. 8.

The governor will be set as in test (b) Par. 11. The load applied will be the rated load and the speed will be that obtained with the gears set as recommended for plowing. If this load should prove to be an overload, it will be reduced until the engine speed is up to rating and the slippage of the drivers on the ground is not more than the board of engineers considers reasonable for the cinder track.

The test will begin after the load is set and the temperature of the cooling fluid has become constant. The duration of the test will be ten hours actual running time, as nearly continuous as possible, with constant load. Record will be made of the time and reason for each stop, also of any adjustments or repairs made on the tractor.

The tractor will be operated by an employe of the University.

Test (g)

15. **Drawbar horsepower test at maximum load.** The object of this test is to determine the maximum drawbar horsepower which the tractor will develop on the cinder track. Records will not be kept of fuel, oil and water used. This test will be made on a level part of the cinder track. The engine will be thoroughly warmed up before this test starts. Record will be made of drawbar pull, rate of travel, wheel slippage and engine speed for each run of approximately fifty feet. For the first run the load pulled will be about the rated load. This will be increased for each successive run until the maximum drawbar horsepower has been determined.

The tractor will be operated by an employe of the university.

Test (h)

17. **Miscellaneous.** This test will be conducted to make observation on any special features of the tractor and may

(Continued on page 51)

Tractor Conditions in the Empire State

BY FRED M. LOOMIS
(Motor Age Editorial Staff)

In Two Parts—Part II

[Mr. Loomis has for the last few months made extensive investigations of the conditions of the tractor industry in various parts of the United States. With his wide acquaintance among tractor dealers, manufacturers and users due to his long experience in this field, he has had exceptional opportunities to obtain a clear insight into the true situation of the industry.

MOTOR AGE this week is presenting the reports of these conditions in the belief that a summary of the situation in one part of the country may prove of value to dealers in other sections of the country. Mr. Loomis will make reports on the situation in other sections of the country in succeeding weeks and in addition will "cover" for MOTOR AGE, the various tractor shows and demonstrations throughout the coming year.]

LIMA, N. Y., is a small town, one of the kind from which tractors are sold. There seems to be a good demand for tractors in its vicinity and obviously the town would appear capable of supporting at least two dealers, although at present there is only one.

There are two motor car dealers and two hardware and implement stores in the town. The tractor dealer is one of the former, W. F. Harvey, the Ford dealer, who has just closed a season with thirty-two Fordson tractor sales to his credit. This shows what can be done.

The other motor car dealer, T. J. McDonald, selling the Dodge, has contracted the tractor itch also and says he would like to get into the business if he could find a tractor which would permit him to compete in price with the Fordson. He is considering an effort to secure the agency for the Samson.

Several Dealers in Lima

The hardware and implement business which is run under the name of C. W. Allen made a start in the tractor business about a year ago with the Case. Unfortunately Allen died a few months ago and the future of the business, now under direction of Allen's father, is uncertain. At any rate it is definitely out of the tractor business for the time being.

The other hardware and implement man, C. R. Gray, says he has troubles enough now without taking on any more trying to sell tractors. He says the overhead of selling is so steep that unless the dealer can make a separate department of the tractor and get volume sales there is no money in it. He says Harvey, with the Fordson, is better equipped to sell tractors, any way, and he is welcome to the business.

As for Harvey, well, you know, there are dealers who just go out and do things yet can't tell for the life of them how they do them. Harvey's that kind of a dealer. He took on the Fordson and went out and sold them, thirty-two of them this season, but he won't admit having any special aptitude nor ability as a tractor salesman. He sold, that's all.

Harvey says his strongest selling argument is the relative economy in the cost of operation and maintenance as between the tractor and horses. Then he relies on his service. He carries an ample stock of repair parts, keeps a competent mechanic and is promptly on the job when anything goes wrong.

Harvey preaches the necessity of proper care for the tractor and now is telling his customers they should have their tractors overhauled during the winter. Two owners already have seen the light and their machines now are in Harvey's shop awaiting attention.

In time Harvey hopes to determine a fixed price for tractor overhaul, but says the business yet is too new to permit of arriving at it with any degree of exactness.

In addition to the tractor Harvey carries and sells a full line of the approved equipment.

"Go right up there a block, then turn to your right and Adams' place is right on the top of the hill; you can't miss it."

So said the agent for the interurban company at Geneva and he was right, you can't miss it. There right on top of the hill is a big snow-white building looking down on everything around it and with a big glass show room built right out of one corner which one can see clear from the shores of Lake Seneca at the other end of the town.

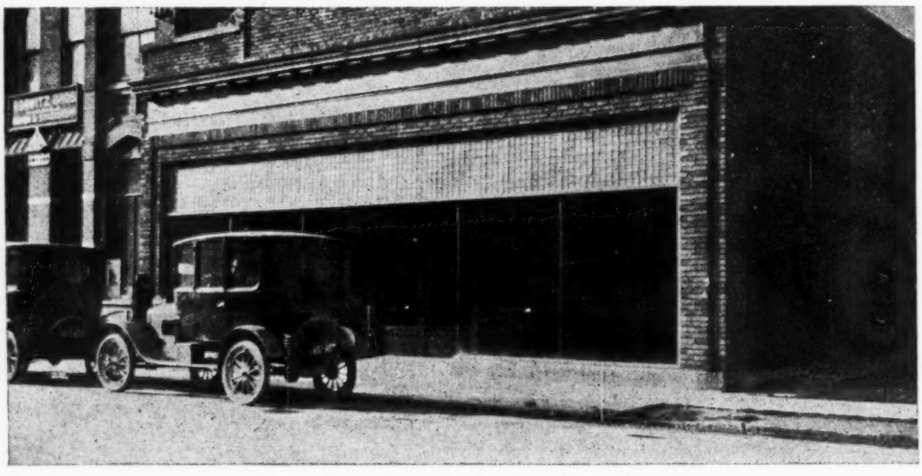
B. L. Adams is the Ford dealer and after a year or so of experience with the I. H. C. tractors he had an opportunity to take on the Fordson and jumped to it. He has perhaps fifty machines out in his territory and he has done it apparently without undue effort or extraordinary preparation for it. He uses the same men who solicit for his cars, but he is a stickler for the right kind of service. He keeps special tractor mechanics and he looks after every bit of trouble his customers complain of.

Implement Dealer in Canandaigua

Adams is the only tractor dealer in the town, as none of the other motor car dealers nor any of the implement dealers seem to have been attracted by the possibilities. The I. H. C. line is sold extensively in neighboring towns, but there is no local competition. It would seem that here is an opportunity for another dealer.

There is an old-time retail implement concern in this town, known as Sisson, Fish & Brewer. Everybody in the country knows all the members of the firm by their front names, and the familiarity is reciprocal. The concern saw the possibilities of the tractor business several years ago and started in with the Case. Last year the Fordson was offered to it and fourteen tractors were sold. The company is, however, not altogether in sympathy with the Fordson plan and rather resents the notion of selling approved implements. It prefers to sell what it pleases. One member of the firm said he was not keen about the future of the business anyway, as he felt the company already had skimmed the cream off the tractor business in the locality, and did not care much what happened now.

When the firm mentioned above discarded the Case for the Fordson the former was taken on by C. W. Case, the Buick dealer



The Clute Motor., Elmira, N. Y. The Clute company is dealer for Ford cars and Fordson tractors, one of the automotive tractor dealers of the Empire state

B. L. Adams, Ford and Fordson dealer in Geneva, N. Y., believes in plenty of display window, as is evidenced by the big show window on the side of his sales and service room

here. This was a case of a motor car dealer taking on the tractor as an emergency proposition and then letting it go when he began to get cars again. This year Case has made no effort to sell tractors but merely orders and supplies repairs for those already in the territory. It is hardly likely he will have his interest revived.

Estey Sells Many Tractors

The man who really sells the greatest number of tractors in Canandaigua is E. E. Estey. Originally Estey was a farmer agent, a type of dealer very common in this part of the country. He was the real tractor pioneer here, as he brought the first tractor into the vicinity of Canandaigua. It was an I. H. C. and Estey has had that line ever since.

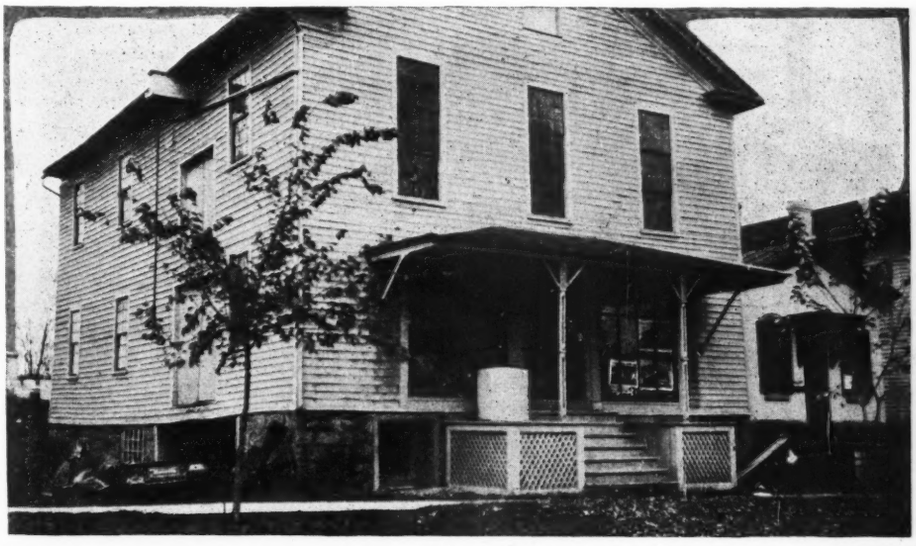
Recently he decided to move to town and become a regularly constituted dealer. He bought a row of buildings near the New York Central depot and now carries a full line of I. H. C. goods. He has put a considerable number of International tractors into the territory and is looking for an active demand this coming season. He makes also a specialty of lubricating oils and is building up a good trade on that line.

Elmira Business Divided

The tractor business at Elmira is divided between De Waters Bros. and the L. D. Clute Motor Co., although two other concerns make some pretension to being in the business.

The L. D. Clute Motor Co. sells the Ford car and, of course, the Fordson tractor. During the season just closing it is likely this concern got the bulk of the local tractor trade.

John Wigsten is responsible for this result. Wigsten is a Cornell man, an agricultural engineer, and was in farm bureau work before he began selling Fordsons for Clute. He says it is necessary for the tractor salesman to "know farming as well or better than the farmer does himself. He must be able to talk crops and the best way to grow



An old residence has been converted into a warehouse by C. W. Allen, who handles the Case in Lima, N. Y.

W. F. Harvey has spacious sales and service rooms for his Fordson tractors in Lima, N. Y.

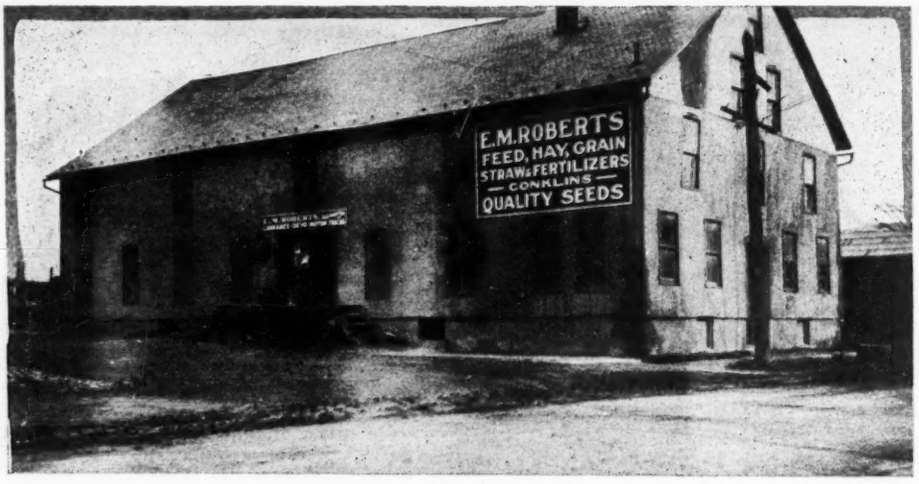
them. He must be up on all the latest methods and he must be able to fortify every statement he makes in favor of power farming with concrete examples that are within the understanding of the farmer. In other words, whatever he says must be to the point and in the farmer's language."

Wigsten has charge of the tractor department for Clute and is making good. He says service is an all important factor and he insists that the Clute tractor service shall be 100 per cent efficient all the time.

De Waters Bros. are the pioneer tractor people here. They brought the first gas tractor into the county and sold it. This was back about 1914. Not much progress was made for three years, but in 1918 the brothers struck their gait with the Avery and sold something like sixty machines. The trade fell off during the last year and, although the line was increased by taking on the Waterloo Boy, the total sales did not run over twenty-five. This

decrease was due entirely to conditions over which the company has no control.

The De Waters firm has been in business here for a good many years and always has specialized on vehicles. During the time when the buggy was in vogue they sold as many as any one else in this part of the country. Now the only horse-drawn vehicle they sell is the farm wagon, while their trade has gone overwhelmingly to the motor car. They sell the Elcar and the Crow-Elkhart with Brockway and Republic motor trucks. In the process of changing from old lines to automotive lines the company has lost patience with the old horse-drawn equipment line and they say they have about made up their minds to abandon it altogether for the tractor and power equipment.



E. M. Roberts of Elmira, N. Y., does a general business in feed, hay and grain in addition to handling the E-B tractor

E. M. Roberts, perhaps, sells more implements, with the Emerson-Brantingham line, than any other implement retailer here. He has the E-B tractor also, but has not done very much with it, principally for the reason that he does not get out after the trade as vigorously as he might.

A. L. Davis' Son, Binghamton, N. Y., one of the oldest and most substantial of the real implement dealers in New York. He handles the International tractor

The same criticism may be laid against George W. Peck, hardware and implement dealer, who has the I. H. C. line. With the demand there is in this section of the country for the I. H. C. tractors it would be possible for Peck to do a good deal more business than he is doing if only he would get busy and canvass a little. Up to date he has not been able to see this. He has the advantage, too, of having a branch of the I. H. C. right in Elmira to help him.

Dairies Important in Binghamton

Here, too, it is evident the automotive interests control the tractor situation, and they will continue to control it unless the implement men get a swifter move on them than they have shown in the past.

There is a little different purpose behind the selling of tractors in and around Binghamton than there is in most localities. It happens that dairying is the primary occupation of a good many of the farmers in this section of New York, hence the winter feeding of the cows is important. Almost on every farm is a silo and these must be filled. Farmers are being talked into buying tractors for this purpose instead of buying a stationary power plant, although dealers say there is more profit for them in selling the latter than the former. Nevertheless, they unselfishly talk the tractor because they honestly think a tractor can be of more use to the farmer.

Binghamton Has Few Tractors

As far as Binghamton is concerned there is not much doing in the tractor way. Two concerns, both old line implement firms, handle tractors. A. L. Davis' Son sells the I. H. C. and I. S. Matthews' Sons sell the Waterloo Boy. Davis has been fairly successful and hopes to see the day when his tractor trade will have sufficient volume to warrant him in putting on a special tractor man, either a salesman or an expert, or both. Up to the present time he has been unable to see his way clear to doing that and actually is not overly enthusiastic over the tractor business because of the low commissions which hardly cover the overhead of selling, if they do that. Matthews has done very little to date in the tractor business.

More machines a good deal are sold from surrounding towns, particularly

(*Continued on page 51*)

E. E. Estey, Canandaigua, N. Y., who came in out of the backwoods and became a real dealer. He sells the International

Garage Planning
Service Station Arrangements

No. 168

DIFFICULT WIDTH FOR GARAGE

I am contemplating the erection of a storage garage on a lot with 65 ft. front and extending back 120 ft. to a paved alley, the elevation of the alley being just right for this. I can thus do away with elevator or ramp. The building would be used for storage purposes and sale of gasoline and oils, with no attempt to do repairing or selling of cars, accessories, etc., that section of the business being conducted in a separate establishment. Would want a part basement to accommodate heating plant, storage for coal, etc. What I would like to have is a design for an attractive front with gasoline and oil stations. Also best method of arranging storage cars in a building of dimensions noted above. Car washing stands should be provided for on each floor.—H. J. Wilson, Fairmont, W. Va.

MOTOR AGE is receiving many inquiries or garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of acres on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

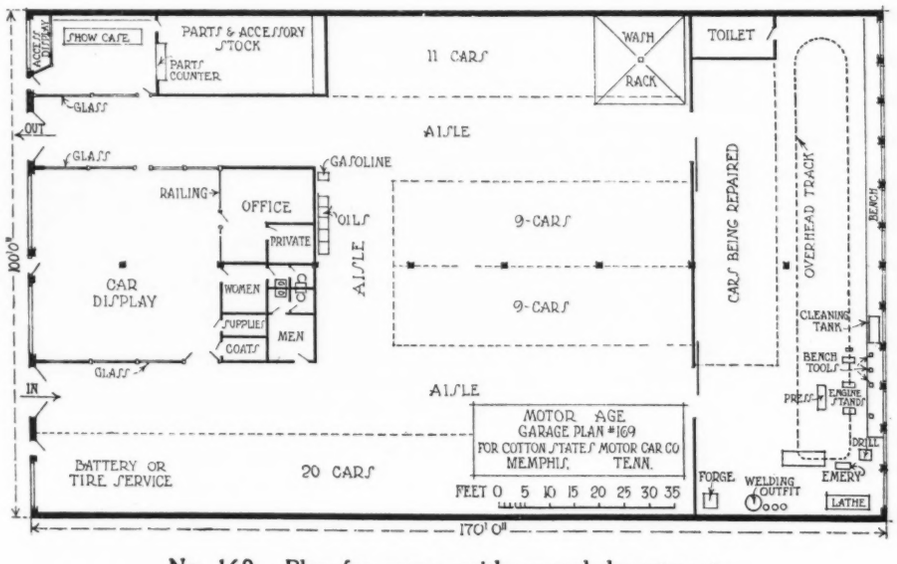
And how much of an accessory department is anticipated.

The width you have is one of the hardest to use economically for car storage, since the aisle between two rows of cars is so much wider than necessary.

It has the advantage of being so roomy and attractive, however, that space in it should be in demand and when a rush of transients come they can be spaced at one side of the aisle as shown. It would be best in anticipation of a condition of this kind to group together all your tenants who leave the garage latest in the morning, giving them the positions where they will not interfere with the cars placed in front of them.

The front of this building is a very simple problem and calls for nothing unusual in design; the main thing is to select some material that is different from the surrounding structure so that it will be seen first, but it should be seen in admiration rather than garishness; that is, it should be substantial and pleasing, with style and up-to-dateness, rather than conspicuous by its gaudiness.

You could have a drive-in filling station, but it would take away from your storage capacity considerably, and an arrangement such as we show probably will answer your needs as well. It might be well to repeat the arrangement on the upper floor.



No. 169. Plan for garage with several departments

No. 169

FOR METAL GARAGE

I would like to have a floor plan for a single story sheet metal garage, 100 ft. wide, 170 ft. long, office and showroom in front, and plan for a medium sized storage place and a first-class service station, including a small machine shop, or, that is, a lathe, drill press, small blacksmith outfit, and also a welding outfit. Should prefer two entrances to the front, one entrance and one exit.—O. D. Lewis, Memphis, Tenn.

Why do you use sheet metal for covering? It always looks like a sham. It is not so cheap when you consider the paint it must have, and even then in a few years it rusts through from the back and you have nothing but the paint left. Metal lath is much cheaper and with two coats of stucco you have a job that is better in every respect, besides being attractive, strong and lasting.

Two entrances in front cut your space up pretty badly, though as you have plenty of width it doesn't matter much. The center space will make a good accessory store. The other side could be utilized as a tire repair shop and tire store or a battery service station; either one would have a show window and entrance same as the accessory store.

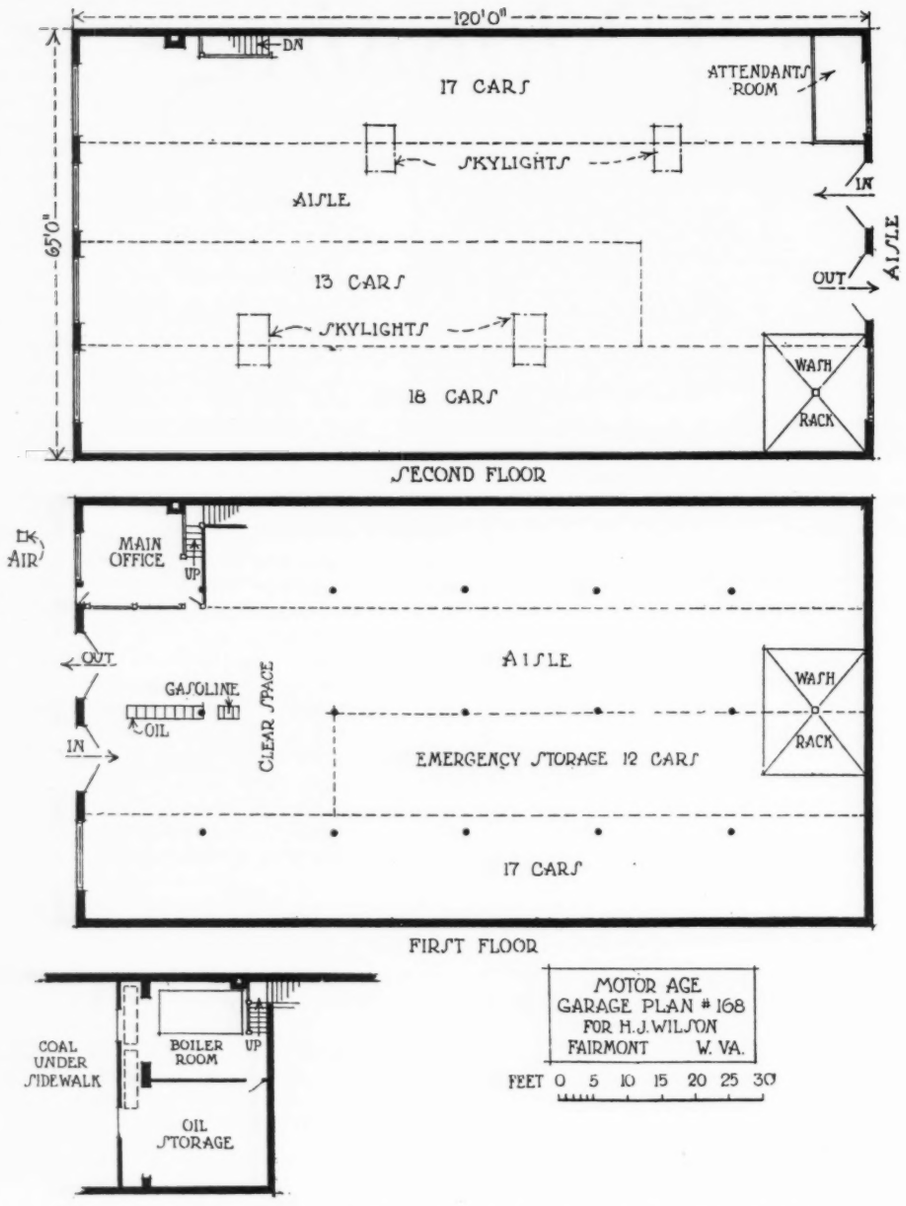
Gasoline and oil station are placed in the aisle back of the office where they can be dispensed by the garage attendant as cars are leaving; cars entering for these materials pass through cross aisle and out again without trouble.

No. 170

FOR FORD STATION

Can you furnish me with the best possible arrangement for Ford sales and service station on the plan shown? I do not want an ordinary garage, so the storage room is not a large item. The location is in a good rental part of the town, so I am cutting off 50 by 25 ft. for that purpose. Thanking you in advance for any information you may give me.—R. A. McEwen, Natoma, Kan.

We believe you are making a mistake in cutting off the spaces for rent, whether they are for stores or small private garages. They cut into your building in such a way that the shop especially and the whole floor to a lesser degree is made much less accessible and handy. Wouldn't it be better and more profitable to make your garage larger and rent space in it to regular customers? In this way you would be more liable to get the benefit of their purchases of gas, oils and accessories and you could utilize the space when not rented; also if space becomes more valuable for your business than for rental the tenants could be ousted and the space used without any alteration.



No. 168. Two-story garage using natural elevation of alley instead of ramp

If this course were followed the rear end could be used for a shop with a partition at A. The shop would then be large enough to contain battery, tool and toilet rooms and leave a clear space 50 ft. wide for storage between it and the showroom. Eight additional cars could be stored, bringing in a revenue of $80 in most sections which, we believe, would be more than your partitioned-off spaces would produce.

You will note that we have moved the battery room to the rear. This is because a battery repair shop is about the most mussy affair about a garage or service station and will add nothing to the attractiveness of showroom or service station entrance.

No. 171

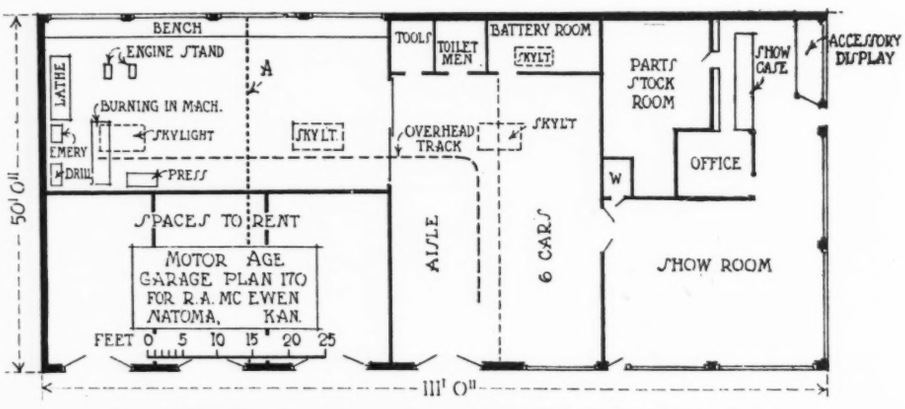
FOR DISPLAY ROOM

I am enclosing sketch of my showroom in which I want to display three cars, Chandler, Cleveland and one Traffic truck. Will also want to place a 6 ft. show case, a desk and a table of about the same size as the desk which is 48 in. Kindly advise me where to place my office and your suggestion as to car arrangement to give a homelike appearance to the place. It now looks like a barn.—Kline Motor Co., Auburn, Wash.

Our first impression was that if a partition could be built on the line "A" the barny appearance could be easily eliminated, as it is undoubtedly the passage-way through this room, combined with the large doors, that give one that out-of-doors or barn feeling. However, on taking a few measurements, we find that while it might be possible to get two cars and a truck into this room, one would not be able to view them with any perspective unless it be from a step-ladder.

All things considered, it would be best to get a larger room if it is impossible to get a rear entrance to the shop.

Failing in these two suggestions, the only alternative would be to eliminate as far as possible all traces of the passage, redecorate and remodel the interior so that instead of being a sort of alley leading from the street to the shop it would be part of the room. Get new doors for both openings of some special design that will give the room a cheery appearance, then with some warm, pleasing decorations your object may be accomplished.



No. 170. Plan for sales and service station handling Ford cars

No. 172

FOR FORD DEALER

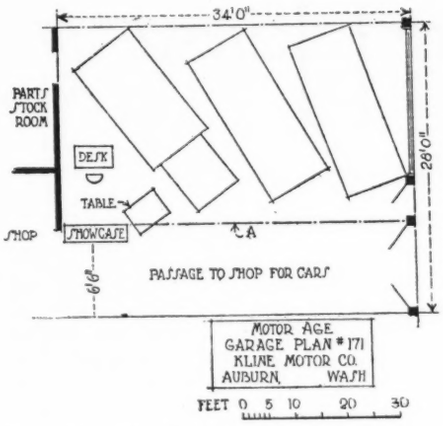
I have a lot on Main street in Hailey, Idaho, on which I wish to build a garage. I am a regular authorized Ford dealer, selling about 75 Fords a year. We are in a snowy country and ought to build a strong roof.

My lot is 58 ft. by 120 ft. and is located on the west side of Main street, with a 58 ft. front running back to the alley 120 ft.

On the north side is a picture show, 60 ft. long, and on the south side is a store, 80 ft. long. I expect to use these other walls as party walls, so that my building will be 58 ft. wide.

I want to operate a regular Ford service station, having a shop equipped with Ford tools, such as are recommended by them—a running and burning-in stand, press, piston clamp, reboring machine, motor stand, rear end stand, drill, emery, etc., and a battery station. I want a show window big enough for one Ford car, an office and a good stock room for Ford parts and accessories; gasoline tank in front of building.

I am undecided whether to try to make it the full length of my lot, 120 ft., or to build it about 90 ft. now, and then add on to it at the back later if business demands. There are three other garages here now. The population of the town is about 1250, but I expect to draw half of my trade from the surrounding territory. About what will be the cost of the building at 90 ft. and 120 ft., respectively? I will build of either brick or cement blocks. I would like to have a plan drawn as soon as possible.—Ernest Phippen, Haily, Idaho.



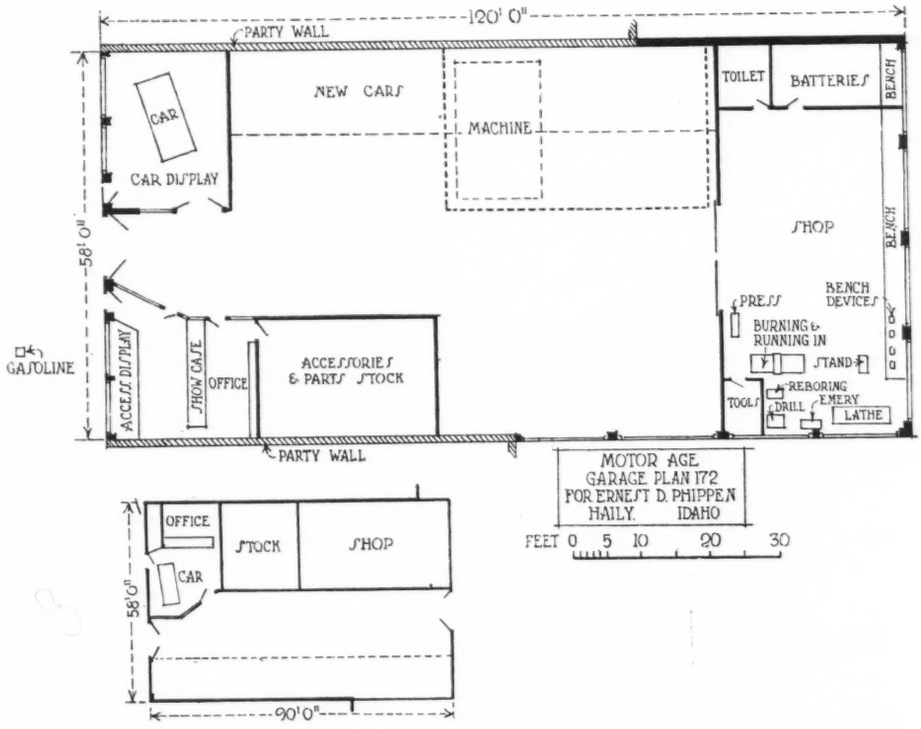
No. 171. Display room plan for cars and truck

Our advice would be to build the whole building now if at all possible. The logical location for the shop would be across the back, so that with an extension of the building to the rear the shop would not have to be moved, incurring considerable expense.

If you decide to build on only 90 ft. then place the shop as shown by the dotted lines, and when you make your addition extend the shop also, but have your machines at the front end so they will not need moving.

The small half-size layout below the large plan may appeal to you more on the 90 ft. proposition. It brings the office, car display and accessories together, which is a good plan especially when it must be taken care of by one man.

We cannot give you any idea of cost of this building, costs vary so greatly throughout the country. If it was to be built in Chicago and on an open lot the 120 ft. length would cost in the neighborhood of $22,000, but that is no guide to the cost in your town, as building in Chicago is probably higher than in any other city in the country.



No. 172. Ford sales and service station with necessary service equipment

Tractor Conditions in the Empire State

(*Continued from page* 48)

from Union and Endicotte, both being practically suburbs of Binghamton. In the former place are Harry F. Stevens, who recently sold out a lumber business to go into the business of selling the Moline-Universal and Moline implements exclusively, and the Surdam Supply Co., an implement company, with the I. H. C. line.

The only automotive dealer in this whole section is S. G. Keys of Endicotte, who sells the Ford car and the Fordson tractor.

Taking things as they are today and it may be said the tractor business is in a rather rudimentary stage in this immediate section of New York. Stevens and Surdam seem to have the clearest conception of what they are going to try to do this coming year. Both are planning a more aggressive campaign than they have put on in the past.

Drawing a final conclusion from the things I have seen and heard while coming through New York I am of the impression there is under way in this state a significant change. I remember some four or more years ago attending a meeting of the New York Retail Implement Dealers' Association at Batavia at which one dealer got up and said that he was the only real implement dealer in his county, while he was surrounded by some thirty farmer agents.

At that time that was by no means an unique situation. The east was filled with farmer agents. Indeed, that was characteristic of the implement business here. Today things are changing from that stage. The farmer agent is disappearing gradually and dealers who can conform to the western definition of a real dealer are taking their places.

How far this is going will be apparent by a single instance. Within five years there were over 500 agents of all kinds selling the I. H. C. line in whole or in part in the relatively small territory under the Elmira branch houses. Today there are only about 100 dealers. Furthermore, of the 100 who are left nearly all are regular dealers with an established place for doing business and with a regular stock of goods on hand. Nearly all of the 400 who have disappeared were of the farmer agent variety who did business out in the country in a barn or under a tree. And the same development is noticeable in the sales organization of other implement concerns in the east, although more credit for bringing it about should be given the International Harvester Co. than to any other one concern, perhaps.

Future Business Outlook Good

This augurs well for the future of the business in the Empire state. Also it is a good thing for the tractor business. Most of these men who have come in from the back woods and who have developed into real dealers, like Estes at Canandaigua, for instance, are selling tractors and are making good at it.

NEBRASKA TRACTOR TESTS

(*Continued from page* 45)

include work on inclines, turning radius, effectiveness of brakes and any other feature which may seem to require special observation.

The tractor will be operated by an employe of the university.

Test (i)

18. **Endurance.** It will not be possible in any reasonable length of test to determine the efficient life of the tractor; however, it will be possible to detect any features that will give continual trouble. Observation will be made of all replacements, repairs, adjustments and cleaning; also, of any difficulty in the operation of the lubrication, cooling, or any other part of the tractor. If an undue amount of wear is suspected in any part of the tractor it may be taken apart for examination at the end of the test.

19. **Application for test.** Tractor companies who desire to have tractors tested will make application on a form supplied by the Agricultural Engineering dept., University Farm, Lincoln. This form calls for specifications of the tractor.

Tractors will be tested in the order in which offers of the tractors for test have come to the university.

The Readers' Clearing House

Questions and Answers

Conducted by ROY E. BERG
(Motor Age Editorial Staff)

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

ASKS CARBURETER QUESTIONS

Q—Publish a vertical sectional drawing of the Model LL3P Ralfield carbureter, as used on the Reo T 6. What causes the gasoline to enter the float chamber when throttle is opened or accelerator is pressed. In other words, what part or parts on the inside of the carbureter are moved when the throttle is opened or acclerator pressed down? Explain fully the specific function of the spray nozzle, metering pin, metering nozzle, constant air opening, dash pot, piston, automatic air valve, lower air valve. Suppose the carbureter is not adjusted for low speed, what difference does it make in the running of the engine? Suppose it is not adjusted for high speed, what difference does it make? How does the engine show that either speed is not properly adjusted? —N. E. Weatherless, Washington, D. C.

Refer to Fig. 2, which is a model G Rayfield carbureter and the only difference between this and the LL3P is that one is waterjacketed and the other is not; the adjustments are the same, also all the parts. This is a two-jet carbureter, one jet feeding at low engine speeds and both at high speeds. There are three air openings, one fixed and operating in conjunction with the low speed nozzle and the other having two automatic valves linked together and operated simultaneously. The high speed nozzle is controlled by the metering pin actuated by the upper automatic air valve. The stem of the valve is connected to a piston working in the dash pot, from which a passage communicates with the float chamber; the dash pot has direct connection with the high-speed nozzle.

When the throttle is opened the tendency of the air valve to open suddenly and excessively and to flutter is checked by the dash pot piston, which at the same time forces an extra supply of fuel into the nozzle and enriches the mixture for acceleration; the slow opening of the air valve increases acceleration by causing strong suction on the nozzles.

In adjusting remember that both adjustments are turned to the right for a richer mixture and to the left for a leaner one.

Answering some of your questions direct, let it be said that when the throttle is opened gasoline leaves the float chamber, going into the intake manifold; this lowers the float and opens a valve to permit more gasoline to enter the chamber. Thus this little valve is always working and keeps the chamber up to a certain fuel level. The functions of the other parts are told above and shown in the figure.

If the carbureter is not correctly adjusted for either speed it simply will not run properly. If there is not enough fuel for high speed work then there is a lack of power; if too much an overloading and consequently a slow burning

Carburetion

charge. It requires a certain proportion of air and gasoline to make a perfect burning mixture, and only this kind will bring full power, keep away carbon and bring snappiness and flexibility of the engine.

When adjusting let the engine become good and warm; this is essential. Begin by adjusting for low speeds. With the throttle closed and the dash control down close the nozzle needle by turning the low speed adjustment to the left with the cam M. Then turn to the right until the block U slightly leaves contact about three complete turns. Now start the engine. Retard the spark lever close the throttle until the engine runs

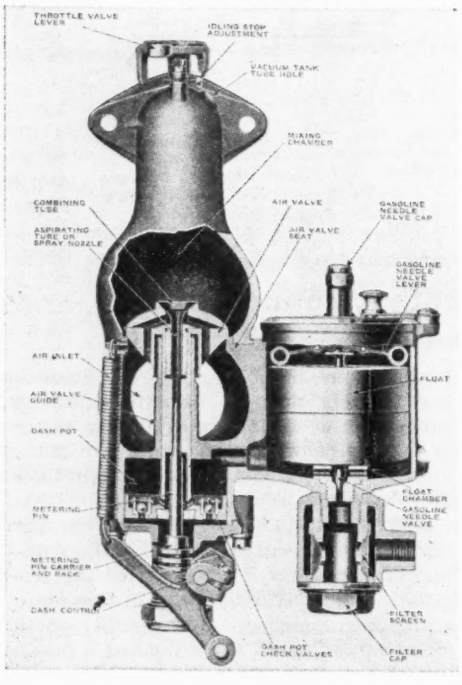


Fig. 1. Stewart precision carbureter used on Dodge car

slowly without stopping. Turn the low speed adjustment to the left until the engine slows down and then, a notch at a time, to the right until the engine idles smoothly at low engine speed. Now advance the spark about a quarter on the segment. If the engine backfires it means too lean a mixture and the high speed adjustment should be turned to the right, leaving the low speed adjustment entirely alone from this on. Keep adjusting to the right a notch at a time until the backfiring has ceased. After you have done these things try the car on the road. If there is a tendency for the engine to choke it means too rich a mixture and the high speed adjustment should be turned to the left, a notch at a time. Then try again, and so on until you have the engine working properly under load.

Before you can get correct carbureter adjustment, however, the engine should be clear of carbon, the valves should be ground and the ignition should be known to be in good shape, otherwise it will be impossible to properly adjust the carbureter so the engine will function correctly.

NEW CARBURETER FOR FORD

Q—In rebuilding a Ford, changing body design, and engine, what size and make of carbureter would you advise?—Hubert Smith, Memphis, Mo.

Stick to the size you have and, for that matter, the make is all right. Any standard carbureter of recent date will do, however, and perhaps give better results than an old type inasmuch as the later types are made to handle the comparatively poor fuel.

ADJUSTMENTS FOR STROMBERG

Q—Publish diagram and give adjustments on the Stromberg carbureter.—Irvine A. Fridge, Elizabeth, La.

1—Fig. 3 shows a Stromberg carbureter with letters indicating the adjustment spots. This is the same whether the flange is on the top or side.

For starting and warming up with the present day fuel, it is necessary to use the dash control until proper operating temperature is attained. Ordinarily the motor will start rapidly with the control closed one-half to three-quarters of the way. In very cold weather it may be necessary to pull the control up all the way, but this should be done only for an instant, as this cuts off all the air and delivers raw gasoline only.

After starting, the control should be drawn up as necessary and, allowing the motor a moment to steady itself, should be set at the point of best power, yet not too rich for smooth running; it should then be gradually lowered.

The high speed is controlled by the

knurled nut "A" which locates the position of the needle "E," past whose point is taken all the gasoline at all speeds. Turning nut "A" to the right raises the needle "E" and gives more gasoline; to the left, less.

If an entirely new adjustment is necessary: Put economizer L in the fifth notch (or farthest from float chamber) as an indicator; turn nut "A" to left, anticlockwise, till needle "E" reaches its seat, as shown by nut "A" not moving when throttle is opened and closed. When needle "E" is in its seat it can be felt to stick slightly when nut "A" is lifted with the fingers. Find adjustment of "A" where it just begins to move with the throttle opening, then give twenty-four notches to the right or clockwise. Then move the economizer pointer L back to O notch (toward float chamber). This will give a rich adjustment. After starting and warming up the motor, thin out the mixture by turning "A" anticlockwise, and find the point where the motor responds best to quick opening of the throttle, and shows the best power.

The gasoline for low speed is taken in above the throttle through a jet at "K," and is regulated by dilution with air as controlled by the low speed adjusting screw B. Screwing B in clockwise, gives more gasoline; outward, less. The best adjustment is usually one-half to three turns outward from a seating position. Note that this is only an idling adjustment and does not affect the mixture above 8 m.p.h. When motor is idling properly there should be a steady hiss in the carbureter; if there is a weak cylinder or a manifold leak, or if the idle adjustment is very much too rich, the hiss will be unsteady.

The economizer device operates to lean out the mixture, by lowering the high speed needle "E" and nut "A" a slight but definitely regulated amount, at throttle positions corresponding to speeds from 5 to 40 m.p.h. The amount of drop and consequent leaning is regulated by the pointer L.

After making the high speed adjustment for best power, with pointer L in O notch, as above described, place throttle lever on steering wheel to a position giving about 20 m.p.h. road speed. Then move pointer L clockwise (away from float chamber), one notch at a time, till motor begins to slow down; then come back one notch.

CLEANING CARBURETER

Q—How is the carbureter cleaned on an Auburn 6-39?

2—How often should carbon be removed?

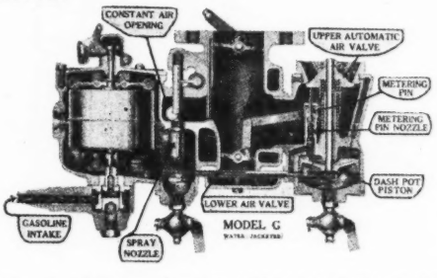


Fig. 2. Sectional view of Model G Rayfield carbureter

O assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

CARBURETION

N. E. Weatherless ....Washington, D. C.
Hubert Smith .....Memphis, Mo.
Irvine A. Fridge.....Elizabeth, La.
Clifford McDowell.....Cozad, Neb.
George Kirk.....Columbus, Kans.
Frank G. Long.....East Moline, Ill.

THE ELECTRIC SYSTEM

Harry Holland.....Shabbona, Ill.
Clifford McDowell.....Cozad, Neb.
Herington Motor Co..... .....Herington, Kans.
B. L. Hailes.....Pittsburgh, Pa.
George Kirk.....Columbus, Kans.
H. E. Adams.....Derry, Pa.
E. O. Hiles.....West Frankford, Ill.
E. H. Jackson.....Ponca City, Okla
Albert E. Neumann.....U. S. A.
John Rensberger.....South Bend, Ind.

MISCELLANEOUS

Chas. B. Shenk.....Lewistown, Pa.
Basil Miller.....Kellogg, Iowa
Horace A. Bruns.....St. Charles, Mo.
C. L. Crawford.....Tueson, Ariz.
M. L. Haynes.....Lafayette, Tenn.
Arnold C. Gunderson..... .....Newell, So. Dak.
Clifford McDowell.....Cozad, Nebr.
H. J. Chadderton.....Farrell, Pa.
D. W. Bell.....Johnson City, Tenn.

ENGINES

E. Christensen.....Tacoma, Wash.
Ed. Earle, Jr.....Salisbury, N. C.
F. C. Lindvail.....Moline, Ill.
Frank S. Timeens..... .....Brandon, Manitoba
Ray Frates..... .....Brule, Neb.

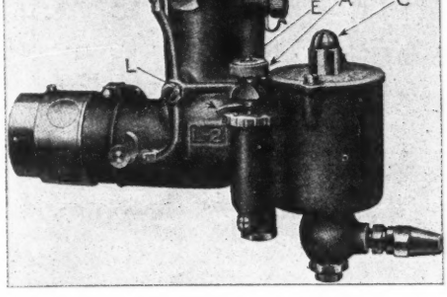


Fig. 3. Illustration of Stromberg plain tube Model L 2 carbureter showing points of adjustm ent

3—How can I remove rings from the piston without breaking them?—Clifford McDowell, Cozad, Neb.

1—Usually it is not necessary to do more than drain at the two drain plugs, one under the float chamber and the other immediately ahead of this and also the drain cock under the air inlet valve. Otherwise the carbureter should be removed from the engine and taken apart, washed out with clean gasoline and reassembled. Care should be taken not to disturb the adjusting screws, however.

2—It depends upon the condition of the engine and how much running has taken place. Ordinarily it is figured, as an average, carbon should be removed after about 2,000 miles of running.

3—Take some old hacksaw blades, smoothen them off on a grinder and carefully slip one under the end of the ring; then slide this around a little ways. Repeat with another piece of blade and so on until you have four pieces under the rings to hold it out of the ring groove. The blades should be long enough to extend above the top of the piston. It will then be easy to slide the ring upward, the blades preventing it from slipping into the grooves. It will be necessary to handle each ring separately. To return the rings into place reverse the operation.

ADJUSTMENT ON RAYFIELD

Q—Illustrate and give adjustment for Rayfield carbureter for a 1913 Mitchell.—Frank G. Long, East Moline, Ill.

Directions for adjusting a Rayfield carbureter are given above.

ADJUSTMENTS FOR CARBURETER

Q—Give the adjustments for the Stewart carbureter used on a Dodge.—George Kirk, Columbus, Kans.

A section of the Stewart carbureter is shown in Fig. 1.

There is but one point of adjustment to the carbureter. This adjustment varies the relative height of the metering pin to the opening of the aspirating tube or spray nozzle when the dash control ratchet on the instrument board is in its regular running position. This adjustment is properly made at the factory and should not be changed unless it is known absolutely to be incorrect.

The tapered metering pin is subject to control within fixed limits by means of the dash control ratchet located on the instrument board, for the purpose of obtaining a rich mixture for starting. Should there be any reason for changing the fixed adjustment of the tapered metering pin, it can be done by turning the stop screw to the right or left as desired. Turning this screw to the right lowers the position of the metering pin and allows more gasoline to be admitted to the spray nozzle, thus enriching the mixture. Turning the screw to the left raises the pin, decreases the supply of gasoline and impoverishes the mixture. Consult a Dodge Brothers Dealer concerning this carbureter adjustment. If it is absolutely impossible to do so, the car owner may experiment to obtain the proper position of the metering pin. Bear in mind that a small part of a turn will make a difference in the amount of gasoline supplied to the carbureter and the action of it. If the carbureter sputters or backfires at high speed the mixture should be given more gasoline.

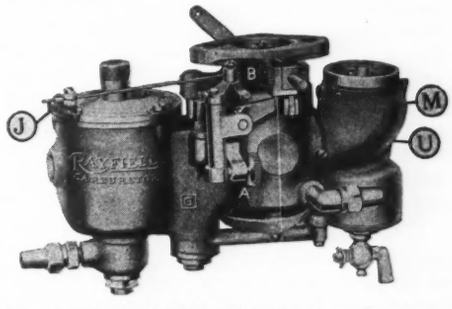


Fig. 4. Rayfield Model G showing positions for adjustment

The Electric System

WIRING DIAGRAM ON DETROITER

Q—Publish wiring diagram of the Detroiter car, model D, No. 8144, eight cylinder.—Harry Holland, Shabbona, Ill.

See Fig. 5.

WIRING ON STODDARD-DAYTON

Q—Publish wiring diagram for a 1912 "Saybrook" model of Stoddard-Dayton.—Herington Motor Co., Herington, Kans.

See Fig. 6.

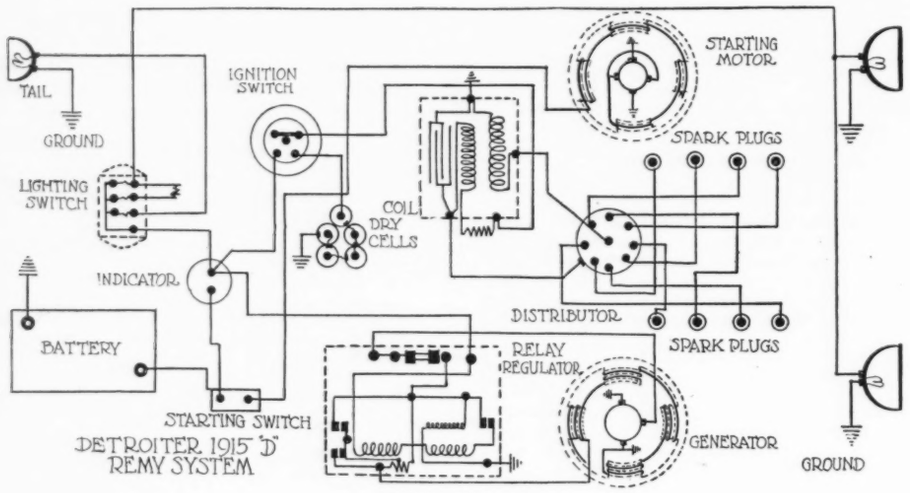


Fig. 5

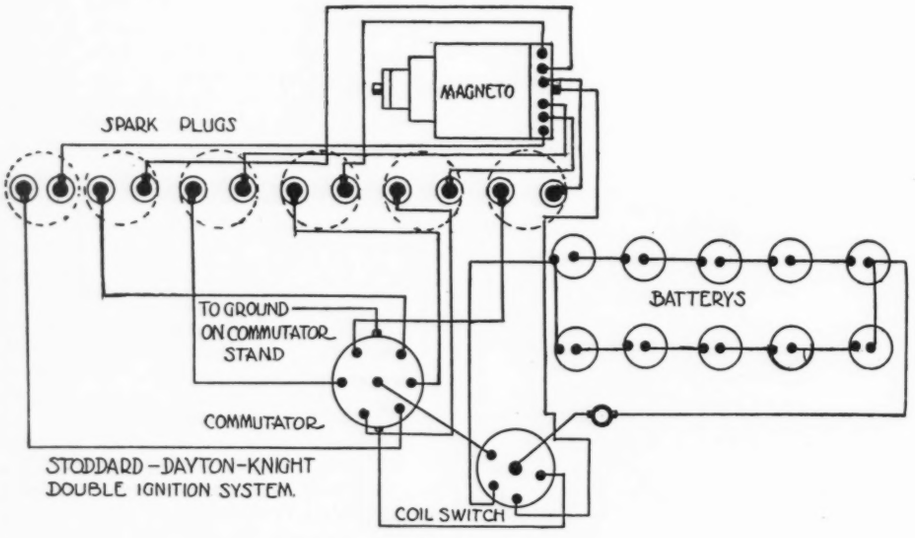


Fig 6

QUERIES ON DODGE CAR

Q—How does the automatic advance change the time of the spark in the distributor on the Dodge car?

2—Should the spark be retarded when the engine is stopped a few minutes and then started again?

3—At what car speed does the automatic advance commence to change the time of the spark?

4—Should the fan belt be left on the fan in cold weather?—George Kirk, Columbus, Kans.

1—The spark lever located below the steering wheel is connected with the manual advance lever on the distributor which advances or retards the position of the fibre block in relation to the breaker cam, and consequently, advances or retards the time of the spark in each cylinder. Besides this manual advance a centrifugal type of automatic advance is connected to the horizontal shaft, and advances the position of the timing cam on the vertical shaft in exact relation to the speed of the engine. Due to the fact that the combustion of the gasoline gas under compression is not instantaneous there is a certain point in the travel of the piston depending upon the speed of the engine at which the occurrence of a spark will produce the maximum power. Naturally this position is somewhat ahead of the top of the piston travel and must be advanced still further as the engine is speeded up. It is the function of this automatic advance to have the spark occur as near as possible to this most efficient position of the piston travel for the different engine speeds. The manual spark control is for the purpose of properly retarding the engine for starting, for making any adjustments to the carbureter or for idling. The proper position for the spark lever for ordinary driving is when it is advanced as far as possible without causing the engine to knock. In starting, the spark lever should be fully retarded. In the fully retarded position of the spark lever the distributor is set to fire so that its spark occurs 5 degrees later, or about ⅝" later than top dead center measured on the flywheel. A variation of ¼" in either direction from this position is allowable.

2—Yes, always.

NEW BRUSHES ON GENERATOR

Q—How are new brushes installed on the generator in an Auburn 6-39?—Clifford McDowell, Cozad, Nebr.

1—On the end of the generator farthest away from the distributor you will find a flat band covering the commutator and brushes, as shown in Fig. 7. This is easily removed by unclamping at the top. The brushes are not so accessible while the generator is in the car as might be and if you think you can remove the generator and put it back without getting the timing out of gear, it will be wise to remove it, because it will be necessary to work in the brushes to fit the commutator.

With one new brush in place at a time proceed as follows: Cut a piece of 00 sandpaper—not emery cloth or emery paper—the length of the sheet and the width of the commutator. Place this brush to be fitted, with the sand side next the brush and the smooth side on the commutator. Take hold of the ends of the sandpaper strip and work them back and forth the full length of the strip. This will cause the brush to shape itself to the commutator, the brush spring holding the brush against the sandpaper. There is, however, a right and a wrong way to do this and the right way is shown in Fig. 8. Work the sandpaper back and forth, being sure the brush is midway at the farthest point away all the time, otherwise the brush will not be formed to fit the commutator.

WIRING DIAGRAM OF COLE

Q—Publish wiring diagram of 1915 Cole four-cylinder engine.—B. L. Hailes, Pittsburgh, Pa.

This diagram was published in the Dec. 18 issue of MOTOR AGE.

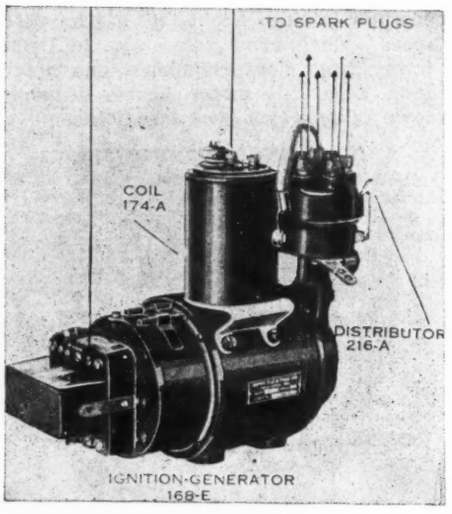


Fig. 7. Generator used on Auburn car

3—The two are connected together mechanically and any advance of the throttle lever is immediately followed by an advance of the spark lever. So, if travelling say 6 m.p.h. and the throttle is opened slightly, then simultaneously with this movement there is a corresponding movement of the spark to bring it to a position that will enable the engine to perform most efficiently.

4—It will be better practice to cover a portion of the radiator—half or more, depending upon the temperature and the extent of driving. However, it will do no harm so long as you watch it and know the water engine is not steaming.

WIRING OF 1910 JACKSON

Q—Publish wiring diagram of a 1910 Jackson car equipped with Splitdorf battery and magnetic ignition.—H. E. Adams, Derry, Pa.

This diagram is not available.

ASKS FOR WIRING DIAGRAMS

Q—Publish wiring diagram of 1916 Oldsmobile model 43.

2—Publish address of concern that sell wiring diagrams.—Albert E. Neumann, U. S. A.

1—The diagram for this car is shown in Fig. 10.

2—Michigan State Auto School, Detroit; U. P. C. Book Co., New York.

FITTING HIGH TENSION MAGNETO

Q—Desire to install a high tension magneto in a Monroe car, model M-2. Could a Bosch magneto or any any four-cylinder high tension magneto be used?

2—Explain with diagram the method of installing a Bosch high speed magneto in car.

3—Can a magneto be run at the generator shaft speed with good results?—E. H. Jackson, Ponca City, Okla.

1—There should be no trouble in fitting a Bosch DU4 high tension magneto to a Monroe engine. All that is necessary is to make a bracket having a base upon which the magneto will rest and in a convenient position.

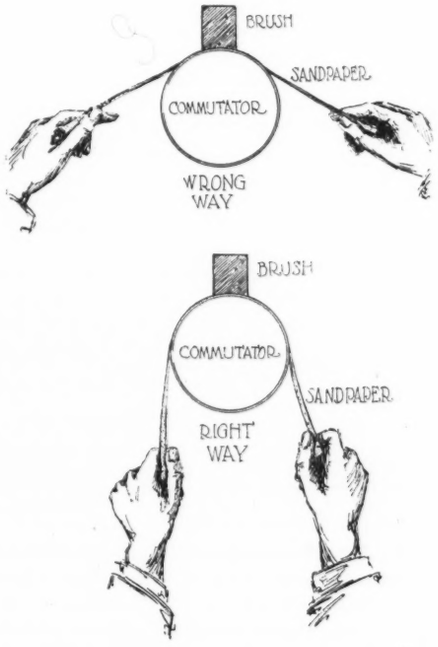


Fig. 8. Showing correct and incorrect method of sanding the brush on the commutator

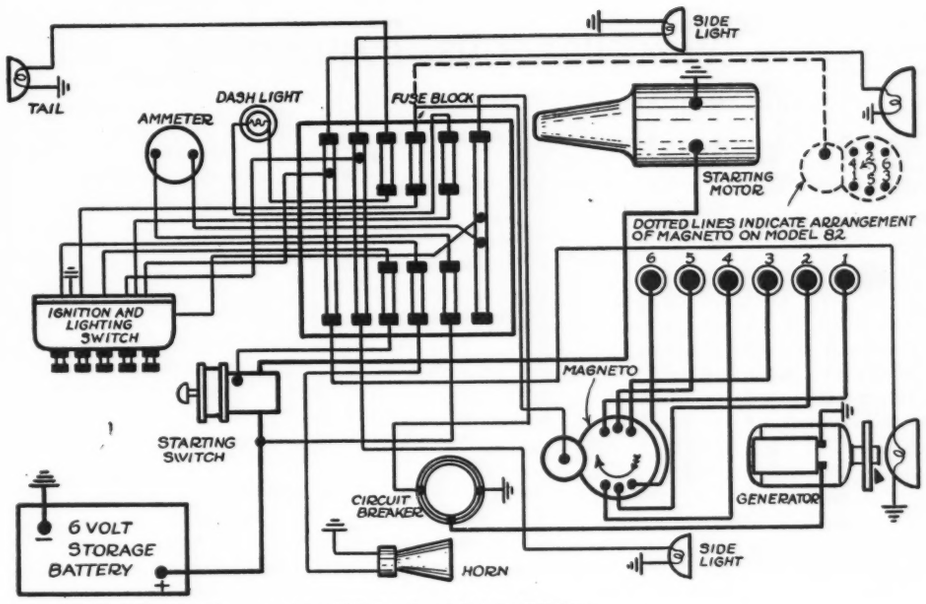


Fig. 9

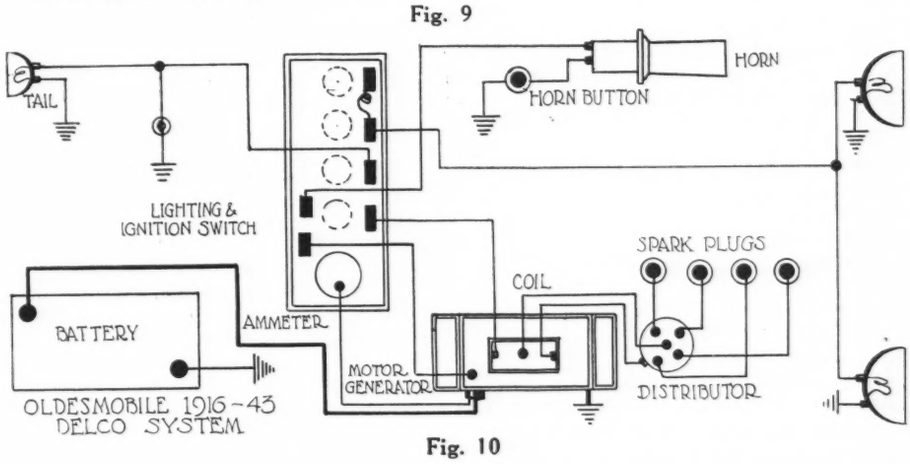


Fig. 10

2—Carry the four high tension wires to the four plugs, in accordance with the firing order, and the wire from the terminal on the breaker box will be carried to a switch on the dash, the other lead from the switch going to the frame or the engine for a ground. When the switch is closed the engine will stop inasmuch as the current will be grounded; it is when this switch is open that the engine will operate.

3—Yes, providing you figure out the speed of the shaft from the driving and driven gears and make your calculations correctly. The speed of the magneto shaft must be the same as the camshaft speed and this can be accomplished with the gears or by sprockets if chain is used.

ASKS ABOUT NEW LANCIA

Q—How do they use a Dixie Magneto on a Lancia twelve-cylinder engine set at an angle of 22 degrees when the power impulses are 22 and 98 degrees apart?—E. O. Hiles, West Frankfort, Ill.

While MOTOR AGE does not happen to have the details of the ignition system at hand, it is probable a special distributer was used, made so the segments of the special distributer would be set to fire correctly. If the Dixie 449 magneto were used, with a separate distributer, this could be made to work easily. It is not likely that the distributer used was of the self-contained type.

QUERIES ON OVERLAND

Q—Publish wiring diagram for Overland, model 86.

2—What model Bosch magneto can be used on this engine?

3—When a magneto is used are the wires run direct from the magneto to the spark plugs?—John Rensberger, South Bend, Ind.

1—This will be found in Fig. 9.

2—The Bosch DU4 will fit, but sure to order one that operates in a clockwise direction.

3—It will depend upon the magneto; but in the case of the DU4, the four wires from the distributor run directly to the four plugs. From the binding post on the breaker box, run a wire to a switch and from the other point of the switch to any portion of the engine or frame to form a ground. The engine is stopped by shorting the circuit on the ground; the switch should be open for running.

Miscellaneous Equipment

OAKLAND REAR AXLE

Q—Publish diagram showing correct and drive shaft of the 1912 Oakland car, model 40.

2—Instruct how to remove the bearing in back of the pinion.—Chas. B. Shenk, Lewistown, Pa.

1—The axle for this car is shown in Fig. ....

2—This necessitates the removal of the tube inclosing the propellor shaft, which is done by disconnecting the front universal joint and dropping the shaft. Then the tube is disconnected at the rear axle. Then use a screwdriver to turn the collar out that holds the bearings in place. When the bearings are out the shaft can be grasped and pulled taking the bearings with it.

REMOVING WORN BALL RACE

Editor MOTOR AGE—It often happenes that the ball race becomes entirely cut in two letting the part of race used to drive against, for removal of race in case of repair, to fall out leaving only a shell remaining with no means of driving it out. An easy way to remove a ball race broken in this way is to drill a ¼-in. hole in hub at A, then insert punch as in Fig. 12 and drive in race until it looks as shown when it can be easily removed.—Basil Miller, Kellogg, Iowa.

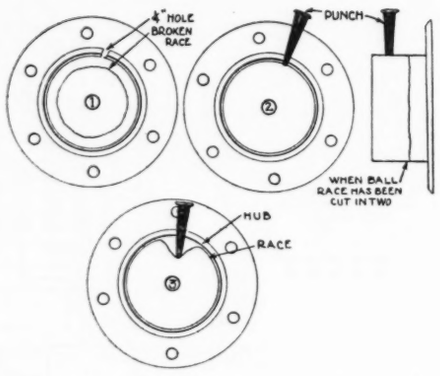


Fig. 12. Suggestion for removing worn ball race

SOLUTION FOR ANTI-FREEZE

Q—State the proper proportions of alcohol, glycerine and water to be mixed in solution for use in radiator to prevent freezing at the following temperatures: 0 deg. zero; 15 deg. below zero; 25 deg. below zero.—Horace A. Bruns, St. Charles, Mo.

Where the percentage is given herewith it means the percentage of solution in water and the solution is on the basis of equal parts of glycerine and denatured alcohol. That is, a 50 per cent solution would mean 25 per cent alcohol, 25 per cent glycerine and 50 per cent water. There is a slight difference between alcohol and glycerine as to the freezing point, alcohol being able to withstand cold a trifle better than glycerine, but they are nearly equal. A mixture of equal parts of alcohol and glycerine forming 28 per cent of the total —making 72 parts water—will freeze at 0; at 15 deg. below it will require a 33 per cent solution of equal parts glycerine and alcohol—and 67 parts water—and to withstand a temperature of 25 deg. below it will require 45 per cent solution. If the temperature runs 25 deg. below it will be safer to use 50 per cent water, 25 per cent alcohol and 25 per cent glycerine.

ACCELERATION IN RACER

Q—I have a racing car that will attain a speed of 80 m.p.h., but the acceleration is poor. The car has a 4⅞ by 6 in. four-cylinder T-head engine that has a flywheel about 18 in. in diameter. In order to obtain better acceleration I am considering turning off the flywheel. How far can I go in this direction with safety?

2—Just how is the weight of a flywheel determined?—C. L. Crawford, Tucson, Ariz.

1—The little difference you would gain in acceleration if the flywheel were cut down will hardly pay for the work. It is more than likely that the lack of acceleration is due to a high gear ratio or possibly to a rather rich mixture. A car that can travel 80 m.p.h. has, however, pretty good carburetion, but it might be improved and perhaps setting the valve timing a notch faster would accomplish still better results. An 18-inch flywheel does not appear to be too large for a big four-cylinder engine.

2—Largely by experiment. You must not overlook the fact that a four will require a larger flywheel than a six in order to help out in the matter of ro torque. Reducing the size of the flywheel would make starting more difficult and would also destroy to a large degree the flexibility of the engine.

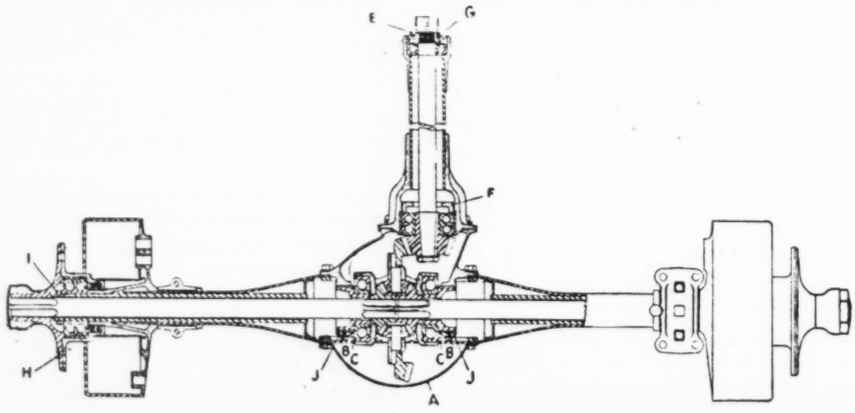


Fig. 11. Rear axle on 1912 Oakland

SELECTIVE TRANSMISSION

Q—Explain the selective type of transmission. How is it connected to the engine and rear axle?—M. L. Haynes, Lafolette, Tenn.

Selective transmission gains its name because of the fact that the operator selects the gear he desires to use. In the old type of progressive gearset it was necessary to engage and disengage one or more gears to get into another set; that is, it was necessary to "go through" the gears. In the later type the operator could select a gear to be used and go into that direct without passing through any other gears. Refer to Fig. 13. This gearing consists of two parallel shafts T and CS, the countershaft CS having keyed to it gears C1, I1, L1 and R1, the latter a squared shaft T carrying the gears I and L. Gear G is an idler used for obtaining the reverse. P is a driving shaft directly connected with the engine through the clutch. Its gear C runs free on the shaft T and is in mesh with the gear C1. Taking first the low speed position it is noted that the drive is from C to C1, to L through L1. On the intermediate speed L is thrown out and I is thrown into mesh with I1. For high speed the claw clutch on I is slid into mesh with a corresponding clutch on C. The drive in this case is "direct," going from P directly out through T, the gears C and I being locked by the clutch. For reverse the gears R1, G and L and in mesh, and as G makes the fifth gear in the system the direction of rotation is reversed. The gears are shifted by means of one control lever, which is placed within easy reach of the driver and this in turn operates one of two arms to which are connected "fingers" that shift the various gears backward or forward on the shaft. There are modifications of this gearset, but the principle is the same nevertheless. As stated, one end of the shaft T is connected by a shaft to the bever pinion at the rear axle housing and this in turn drives a larger gear, called the ring gear, which operates the cross drive shafts and through this means turns the rear wheels. The other end of the transmission shaft is connected to the clutch, which in turn is connected to the engine shaft and thus the power is transmitted all through the system to the driving wheels.

TAKING UP BACKLASH

Q—How may the backlash be taken up in the differential of an Auburn 6-39?

2—Where can information be obtained on the repairing of cars and tractors?—Clifford McDowell, Cozad, Nebr.

1—It will require a close examination of all driving parts to determine where the backlash comes in. Probably the greater part can be taken up by adjusting the pinion and ring gear and this is accomplished by removing the little cover on top of the pinion and pinion shaft housing and turning the adjusting wash-

er to the right to tighten and to the left to loosen. This will bring the pinion into closer mesh with the ring gear. Care must be exercised not to have it too tight, however, and several trials will be necessary to bring it where it belongs. There should be just hardly a trace of play in the gears and yet there should be freedom in rotation.

Another place where backlash may come is in the universal joints and it is usually cheaper and better to install new bushings here. Not infrequently a key has become worn, letting one of the universal halves have play, or possibly the pinion gear key has worn to permit play. New parts will be necessary to remedy such defects

2—Write the U. P. Book Co., 243 West Thirty-ninth St., New York, which can supply you with anything in the book line pertaining to automotive affairs.

ASKS FOR SOLDERING INFORMATION

Q—Publish the name and address of a publication featuring soldering in different kinds of repair work relating to motor cars.—Arnold C. Gunderson, Newell, So. Dak.

We know of no book especially devoted to soldering, but MOTOR AGE of November 27 issue devoted considerable space to the subject and has from time to time give nmaterial hints on the subject.

DETAILS ON CHALMERS 29

Q—What is the gear ratio in rear axle and the final gear ratio on each of the four forward speeds and reverse on a four-passenger Chalmer car, six-cylinder, model 29?

2—What is the weight of the above mentioned car?

3—What is the tire size of this model and the probable maximum speed when the car is in good condition?—H. J. Chadderton, Farrell, Pa.

1—3.9 to 1 is the final drive ratio. The others are not available.

2—This car weighs about 3700 lbs.

3—The tires of this model were 35 by 4½ in.

CASTOR OIL AS LUBRICANT

Q—Is it advisable to use pure castor oil in a Buick crank case? If so, what is the advantage of using same?—D. W. Bell, Johnson City, Tenn.

Castor oil is an excellent lubricant for engines inasmuch as its purity reduces carbon deposits and its flash point and other lubricating features are very suitable to a gasoline engine. However, its cost is such that its use is not practical. Gas engine oils of the best grade so nearly approach the value of castor oil that the use of the latter is not advised in view of its expense.

VALVE SETTING FOR CHANDLER

Q—Publish diagram showing the valve setting for a Chandler car, model 17.—Frank S. Timeens, Brandon, Manitoba.

The exhaust valve is timed to close 1⅝ in. measured on the flywheel past dead center on the suction stroke. The inlet valve is timed to open 1⅞ in. measured on the flywheel past dead center on the same stroke.

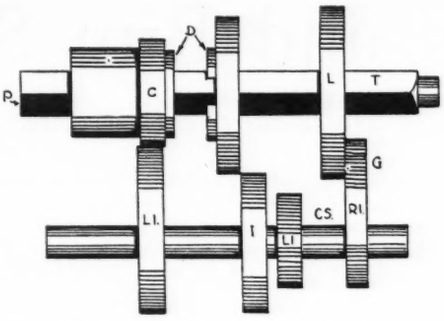


Fig. 13. Layout of gears in selective type transmission

The top dead center may be determined by turning the flywheel until the mark on the flywheel comes opposite the top of the flywheel housing underneath the upper floor board will enable one to find the marks without any difficulty. When the marks on the flywheel and case are opposite one another number one piston is at top center.

With the valves closed the clearance between the valve plungers and valve stems should be .004 of an inch with the engine hot.

MEANING OF "TORQUE"

Q—Explain what is meant by the term "torque," whether it means overcoming inertia, or the twist of the rear axle on rough roads.

2—What are the "S. A. E." and "N. A. C. C." horse-power formulae?

3—Are there any mechanical reasons why a six-cylinder Knight engine would not be as much of a success as the four-cylinder of this type?—F. C. Lindvall, Moline, Ill.

1—In two words torque may be described as rotary force. The more evenly the power is applied the better the torque and this is the reason for the claim that a twelve-cylindered engine has better torque than a four. When power is applied through a bevel gear and pinion to the drive shafts withing a rear axle housing the tendency is to twist the housing and to prevent this a torque—or torsion—rod or tube is used to prevent this.

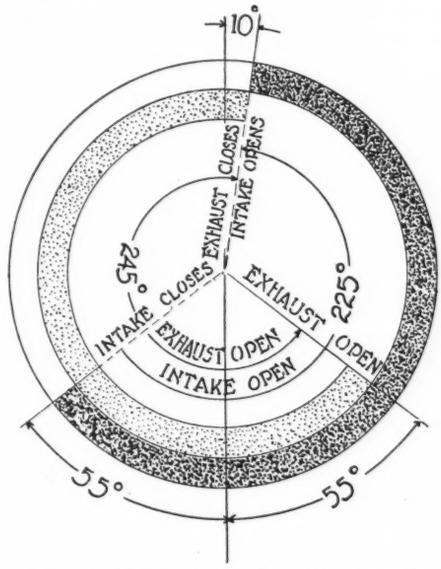


Fig. 14. Valve timing diagram for Stutz car

2—Originally the formula was the A. L.A.M., then the S.A.E., meaning Society of Automobile Engineers; now it is N. A. C. C., or National Automobile Chamber of Commerce. The formula is the same and is

$$B^2 \times N \times .4$$

in which B is the bore of the cylinder in inches, N the number of cylinders and .4 a constant that has been determined.

3—No, and six-cylinder Knight engines have been and are being made. The Stearns has been in both six and eight form and the R. and V.-Knight, or otherwise the old Moline-Knight, is now being turned out in six form.

REPLACING OVERLAND CASTING

Q—On a model 83 Overland with separate cast cylinders, wish to replace with a block casting such as used in the 83-B Overland. Is that all that is necessary to secure an 83-B block and cylinder head or will further equipment be needed?—Edwin Earle, Jr., Salisbury, N. C.

As the 83B casting will fit the 83 all that is necessary will be the casting.

DRAGGING TRANSMISSION

Q—After a Ford has been driven for some time it seems as though the transmission drags. To overcome this what parts would it be necessary to replace?—Ray Frates, Brule, Neb.

The most satisfactory method of supporting a frame under the conditions will be to make a truss, although a plate riveted to the inside of the frame may be able to do. The plate cannot, however, be made to draw up and if the frame happens to sag again then the work must be done over. In the case of the plate, it should be about 3 ft. long, as wide as the inside section of the frame and fitted as closely as possible. The body should be off the car in making this repair, whichever is selected. Place a timber on the front end of the frame or bent sagged side piece of the frame and wedge it against a low ceiling beam. Do likewise with the rear end of the frame member. Then place a jack under the spot where the drop shows, with a 3 by 6 in. iron plate between the frame and the jack. Jack up the frame until it is a little out of line the other way. Now fit the 3 ft. plate and hot rivet it in at least eight places.

The better, quicker and cheaper way will be to make a truss.

Use about 3/16 in. rod, flatten at one end and attach to the under side of the frame by bolting or riveting. Place between the frame and the truss rod, at A, a stud not under 3 in. high and with a hole through which to run the truss rod. There will have to be a flat portion to bolt to the frame. Bend the rod where it passes through the eye in the stud and between the stud and the other end of the rod, which is fastened to the frame as in the case mentioned, interpose a right-and-left turnbuckle. Then all that is necessary is to turn the turnbuckle until the frame becomes straight and repeat the operation if it tends to sag any more. It will be well to use a good sized cotterpin through one end of the rod to prevent the turnbuckle from loosening.

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 73

One of a series of weekly pages of information valuable to service men and dealer—Save this page

1917 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Lambert, 90		34x3½			
Lambert, 80		33x4			
Laurel, 35		32x3½			
Lexington, 6-O-17	Goodyear	32x4	S. S.	Dem. Type A	Goodyear
Liberty, 10-A	Opt	32x4	S. S.	Demountable	Firestone
Locomobile, R. & M.	Goodyear	35x5		Q. D. D.	Firestone
Luverne, 17		35x4½			
Madison		34x4		S. S.	Firestone
Maibohm, A	Opt	30x3½	Clincher	Demountable	Stanweld
Majestic, M		32x4			
Majestic, A		35x5			
Marion-Handley, 6-40		32x4		S. S.	Firestone
Marion-Handley, 6-60		35x4½		S. S.	Firestone
Marmon, 34	Goodrich	32x4½	Front, C-ribbed Rear, C-Non-skid	S. S.	Stanweld
Maxwell, 25		30x3½	Clincher	Demountable	
McFarlan		35x5		Q. D. R	Firestone
Mercer, 22-73		32x4 34x4½		Q. D. C	Howard and Stanweld
Metz, 25		32x3½		Clincher	Firestone
Mitchell, C-42		34x4	S. S.	No. 21	Stanweld
Mitchell, D-40		32x4	S. S.	No. 21	Stanweld
Moline-Knight, C	Goodrich Firestone	34x4	S. S.	Demountable	Firestone
Moline-Knight, G	Goodrich Firestone	35x4½	S. S.	Demountable	Firestone
Monitor, C	U. S.	32x3½	S. S.	Demountable	Goodrich
Monitor, M	U. S.	33x4	S. S.	Demountable	Goodrich
Monroe, M-3		30x3		Q. D. C	Jackson
Monroe, M-4		32x4		S. S.	Firestone
Moon, 6-43	Miller	33x4	Geared to Road	S. S.	Firestone
Moon, 6-66	Miller	35x4½	Geared to Road	S. S.	Firestone
Murray, 70-T		34x4½		Q. D. R	Firestone
Napoleon, 30		31x4			
Nash, 681 to 685	Goodyear	34x4		S. S. Dem.	Sranweld
National, AE & AH	Opt.	34x4½	Clincher	Q. D.	Firestone
Nelson, A	Goodyear Cord	32x4	S. S.	Dem. S. S	Kelsey
Nelson, B	Goodyear	32x4	S. S.	Dem. S. S	Kelsey
Oakland, 34	Goodyear	32x4	S. S.	Demountable	Perlman
Ogren, 102		34x4½			
Oldsmobile, 37		32x4		S. S.	Baker
Oldsmobile, 45		34x4		S. S.	Baker
Overland, 90		31x4		No. 23 Solid Dem. Clincher	Stanweld
Overland, 90		31x4		Clincher	Houk & Budd
Overland, 85-4 & 85-6		32x4 33x4½		No. 21 Dem. S.S.	Stanweld
Owen Magnetic, M-25		34x4½		Q. D. C	Stanweld
Owen Magnetic, O-36		35x5		Q. D. C	Wire Wheel
Packard, 225 & 235	Goodyear	34x4½	Clincher	Q. D. D.	Firestone
Paige, 6-39		32x4	S. S.	S. S.	Kelsey
Paige, 6-51		35x5	S. S.	S. S.	
Partin-Palmer, 20		30x3½		Clincher	Perlman
Partin-Palmer, 32		32x3½		Clincher	Perlman
Paterson, 6-45		32x4		S. S.	Perlman
Pathfinder		35x5			
Peerless, 56		35x4½		S. S.	Firestone
Phianna, M	U. S. Royal Cord	32x4½	S. S.	Q. Dem. S. S.	Firestone
Pierce-Arrow, 38-C-4		36x4½			
Pierce-Arrow, 48-B-4		37x5			
Pierce-Arrow, 66-A-4		38x5½		Q. D. C	Goodyear
Pilot, 6-45	Goodyear	32x4	Diamond	Dem. S. S	Stanweld Firestone
Premier, 6-B	Opt.	35x4½	Opt.	S. S.	Firestone
Princess, 4-36-F		32x3½		S. S.	Firestone
Pullman, 424-32		31x4		Q. D. C	Firestone
Regal, J		30x3½		Clincher	Firestone

ABBREVIATIONS:
S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 74

One of a series of weekly pages of information valuable to service men and dealer—Save this page

1917 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Regal, F		33x4		S. S.	
Reo, R. & S	U. S.	34x4	S. S.	Demountable	Stanweld Firestone
Reo, M. & N	U. S.	34x4½	S. S.	Demountable	Stanweld
Richmond, 6-17		35x4½			
Roamer, 6-45 & 6-54	Goodyear Cord	34x4	Front Ribbed	S. S.	Stanweld
Roamer, 6-90	Goodyear Cord	34x4½	Rear-A.W.T		
Sayers, Series P	Goodyear	32x4	S. S.	E	Firestone
Saxon, B-5-R		30x3		Clincher	Prudden
Saxon, S-4		32x3½		S. S.	Stanweld
Scripps-Booth, D		32x4		Clincher	Houk
Seneca, F	Goodrich Firestone	30x3½	Clincher	Clincher	Prudden
Simplex		37x5		Q. D. C	Firestone
Singer, 17	Goodyear	35x5	Clincher		
Standard, F	Firestone	34x4		Firestone	Firestone
Stanley, 728		34x4½		Q. D. C	Firestone
Stanley, 730 & 731		35x4½		S. S.	Firestone
States		32x3½		S. S.	Firestone
Stearns-Knight, SKL-4	Goodyear	34x4	S. S.		Goodrich
Stearns-Knight, SK-8	Goodyear	35x4½	S. S.		Goodrich
Stephens, 60 & 70		32x4	S. S.		Stanweld Kelsey
Studebaker, ED-6 & SF-4	Goodrich	34x4		Q. D. S. S.	Kelsey
Stutz, R		34x4½		S. S.	
Sun, 17		34x4		S. S.	Firestone
Templar, 445	Goodrich Cord Goodyear Cord Firestone Cord	32x4		S. S.	Parker
Velie, 27	Goodyear	35x4½		S. S.	Goodyear
Velie, 28	Goodyear	32x4		S. S.	Goodyear
Wescott, S-17	Firestone	34x4	S. S		Firestone
White, 16 Valve Four		37x5			
Willys-Knight, 88-4		34x4½ 35x5		No. 21 Dem. S. S.	Stanweld Houk
Willys-Knight, 88-8		35x5		No. 21 Dem. S. S.	Houk
Willys Six, 88-6		35x4½		No. 21 Dem. S. S.	Stanweld
Winton, 22	Standard	37x5	Clincher	A	Firestone
Winton, 22-A	Standard	36x4½	Clincher	A	Firestone
Woods, Dual Power		34x4		Q. D. C	

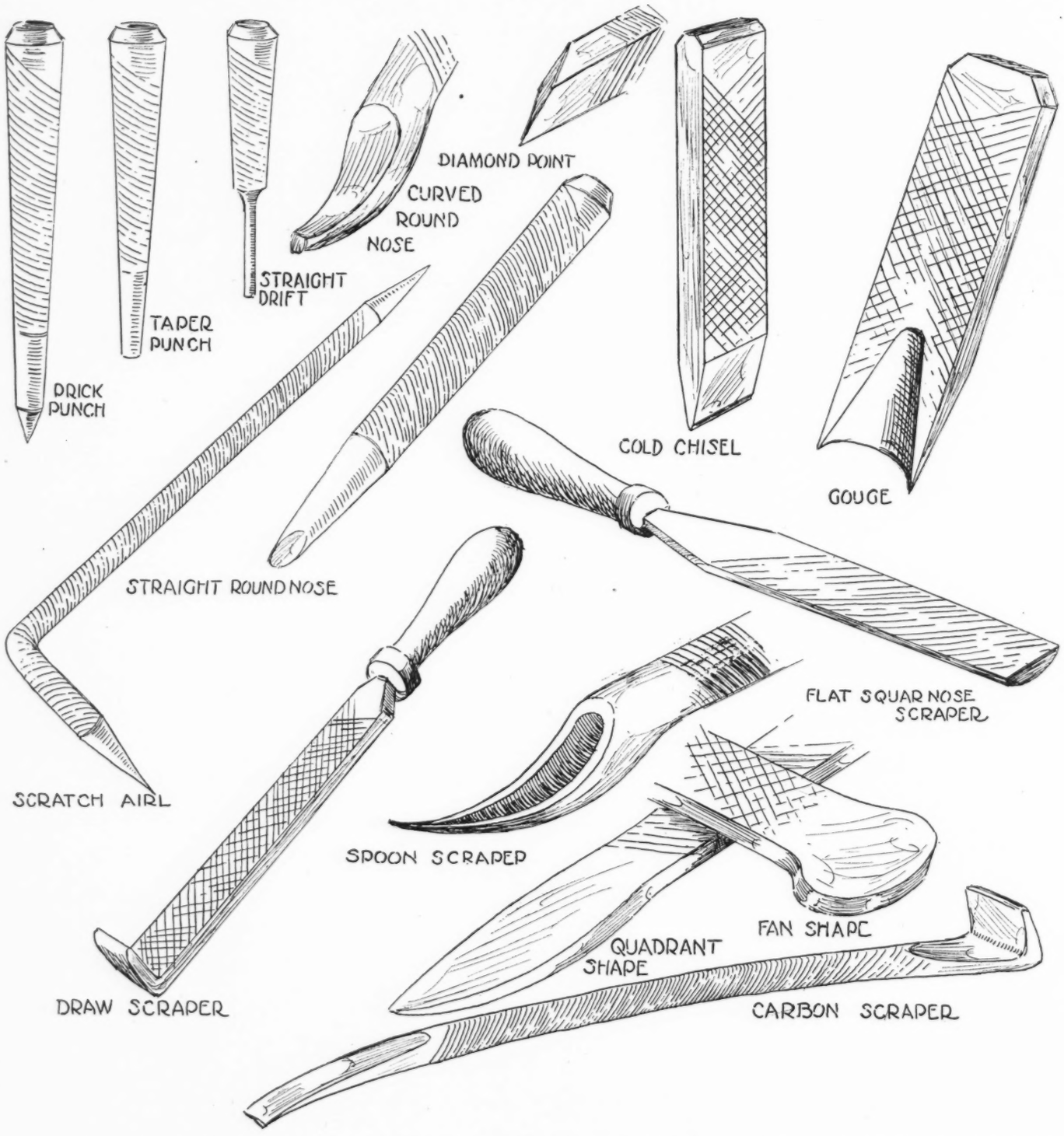
1918 Cars

Allen, 41		32x3½		Demountable	Firestone
American, B	Firestone	32x4			Firestone
Anderson, S-18		33x4	S. S.	Q. D	Firestone
Apperson, 6-18 & 8-18	Goodrich Cord or Goodyear Cord	34x4	S. S.	Demountable	Firestone
Apperson, Anniversary		32x4½	S. S	Frayer Wire Wheel	Frayer
Auburn, 6-39-B	Goodrich	34x4	S. S		Firestone
Arbenz, 25		30x3½	Clincher	Demountable	
Auburn, 6-39 Sport	Goodrich	32x4	S. S		Firestone
Austin		34x4½		Q. D	Firestone
Biddle, H	Silvertown Cord Firestone Cord	32x4	Q. D	Q. D. C	Stanweld No. 52
Bour-Davis, 18-B	Goodyear	33x4½	S. S	Demountable	Perlman
Brewster		34x4½		S. S	Firestone
Briscoe, 4-24	Ajax & Miller	30x3½	Clincher	Clincher	Perlman
Buick, E-4-34 & 35		31x4	Clincher	Demountable	
Buick, E-6-44, 45 & 46		34x4	S. S	Demountable	
Buick, E-6-49 & 50		34x4½	S. S	Demountable	
Cadillac, 57	Goodyear	34x4½ 35x5	S. S	Dem. S. S	Kelsey

ABBREVIATIONS:
S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

The Motor Car Repair Shop

Practical Maintenance Hints

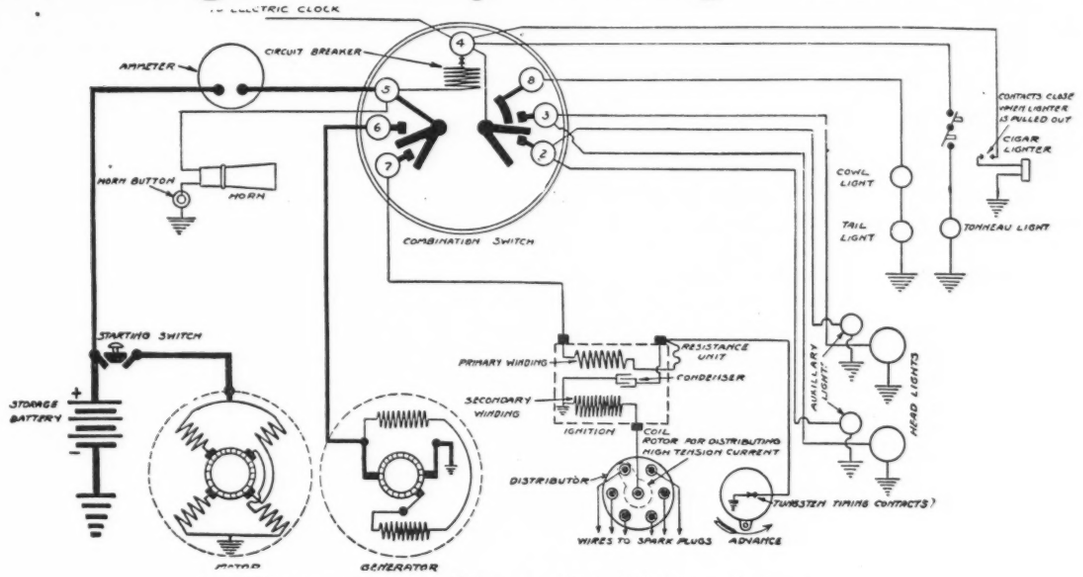


TOOLS MADE FROM FILES

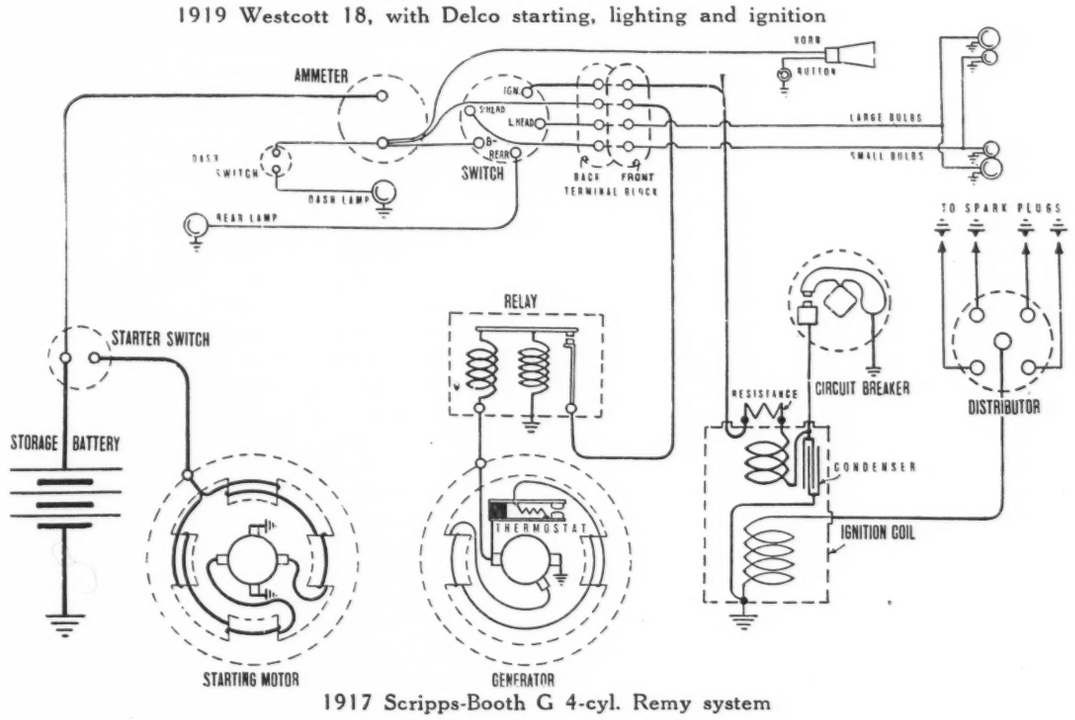
IN the above are shown many uses to which old and worn files may be put. The means necessary to make these tools are, a grinder, a forge, either gas or coal, and the anvil of course, a little ingenuity, and a pocket knife to whittle out the handles for the tools.

The prick punch, the taper punch, and the straight drift are made from old rat-tailed files, by grinding. It may be necessary to draw the temper of the files by heating them and then allowing them to cool off gradually. After cooled the end should be heated to a dull cherry red and dipped in water. The other tools made from rat-tail files are the scraper, the scratch awl and the straight round nose tool. The other tools are made from bastard files. These are forging jobs and will require some little work to make the tools as well as they should be made, without leaving hammer marks on the metal.

Motor Age Weekly Wiring Chart No. 60



1919 Westcott 18, with Delco starting, lighting and ignition



1917 Scripps-Booth G 4-cyl. Remy system

THIS WEEK

1917 Scripps-Booth
1919 Westcott

Abbott—March 20-27, '19
Alco—April 24, '19
Allen—Dec. 18, '19
Alter—Nov. 14, '18
Apperson—March 6, '19
Auburn—Nov. 27, '19
Briscoe—Oct. 16, '19
Buick—Nov. 21, '18; April 3, '19; Oct. 23, '19
Cadillac—Dec. 19, '18.
Carterear—May 1, '19
Case—Feb. 27, '19; Oct. 2, '19
Chalmers—Feb. 20, '19; March 27, '19; Nov. 27, '19
Chandler—April 3, '19
Chevrolet—Nov. 28, '18; March 27, 19
Cole—Jan. 23, 19, April 3, '19
Crow-Elkhart—June 26, '19
Cutting—Nov. 6, '19
Daniels—Dec. 4, '19
Davis—May 8, '19; Dec. 4, '19
Detroiter—March 6, '19
Dodge—Dec. 12, '18
Dorris—Dec. 11, '19
Dort—March 13, '19
Elgin—Feb. 27, '19
Empire—March 13, '19; Oct. 30, '19
Essex—Oct. 23, '19
Ford—Jan. 30, '19; Feb. 6, '19; May 15, 22, '19
Franklin—June 19, '19; Dec. 11, '19
General Battery Charging—May 29, '19; Sept. 25, '19
General Magneto Diagram—June 5, '19
Grant—Feb. 27, '19; March 27, '19
Haynes—Sept. 4, '19; Oct. 9, '19
Henderson—April 3, '19
Hudson—Dec. 5, '18; May 1, '19
Hupmobile—Feb. 13, '19; Oct. 16, '19
Internal Connections—July 10-17-24, '19
Interstate—March 13, '19
Keeton—Nov. 6, '19
King—July 3, '19
Kissel—July 3, '19
Krit—Feb. 6, '19
Lexington—April 24, '19; Jan. 1, '20
Liberty—Jan. 1, '20
Little—March 20, '19
Locomobile—Jan. 23, '19; April 17, '19
Marmon—Jan. 9, '19; Dec. 25, '19
Maxwell—Jan. 16, '19; Aug. 14, '19
Marion—March 6-20, '19
Mercer—Jan. 23, '19; Aug. 28, '19; Nov. 27, '19
Michigan—March 20, '19
Mitchell—Jan. 9, '19; Jan. 8, '20
Monroe—Oct. 30, '19
Murray—May 1, '19
National—June 19, '19
Oakland—Jan. 2, '19; Oct. 16, '19
Oldsmobile—Jan. 23, '19
Overland—Nov. 7-14, '18
Owen-Magnetic—Sept. 18, '19
Packard—June 19, '19; July 31, '19
Paige—July 3, '19
Paterson—March 20, '19; June 26, '19; July 9, '19
Pierce-Arrow—Oct. 2, '19
Premier—April 10, '19; Dec. 18, '19
Pullman—April 10, '19
Regal—Feb. 6, '19; April 10, '19
Reo—Feb. 27, '19; Aug. 21, '19; Oct. 9, '19; Nov. 13, '19
Saxon—April 17, '19
Scripps-Booth—Dec. 26, '18
Simplex—April 17, '19
Stanley—June 26, '19
Stearns-Knight—April 24, '19; Jan. 8, '20
Studebaker—Dec. 26, '18; Dec. 25, '19
Stutz—Jan. 23, '19
Velie—April 24, '19; Sept. 25, '19
Westcott—May 8, '19
White—Sept. 25, '19
Special Systems for Fords—May 15-22, '19

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Type of Electric System	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp.
Allen 43	Single	Conn	Hand	A-L	6	A-L	6	Prest-O-L	80	6	1	GI	GT	6	15
American B	Single	Conn	Hand	West	6	Remy	6	Williard	90	6	1	S	3-A	1.250	20
Anderson All	Single	Remy	Hand	Remy	6	West	6	Williard	90	6	1	S	SAE	6	5
Apperson All	Single	Remy	Hand	Bijur	6	Bijur	6-8	Williard	108	6	1	S	Open	1.250	10
Auburn 6-39	Single	Remy	Hand	Remy	6	Remy	6	Williard	80	6	1	S		6-8	25
Beggs 19-T & 19-R		Conn	Hand	A-L	6	A-L	6	Willard	80	6	1	GT	Cart	6	15
Biddle B-1 & B-5	Single	Simms	Hand	G & D	6	G & D	6	Willard	90	6	1	S	GT	6	10
Bour-Davis 20	Single	Remy	Hand	Remy	6	Remy	6	Willard	103	6	1	S	GT	6	15
Brewster	Single	Berling	Hand	U. S. L.	12	U. S. L.	12				1				
Briscoe 4-34	Single	Conn	Hand	A-L	6	A-L	6	Prest-O-L	80	6	1	GI	GT	6	20
Buick	Single	Delco	Hand	Delco	6	Delco	6	U. S. L.	80	6	1	S			
Cadillac 59	Single	Delco	H. & A.	Delco	6	Delco	6	Exide	130	6	1	GM			
Case V-20	Single	West	H. & A.	West	6	West	6	Willard	117½	6	1	GI	5AGT	50	105
Chalmers 35C	Single	Remy	Hand	A-L	6	A-L	6	Prest-O-L	106	6	1	GI		6	151
Champion KO	Single	Delco	Hand	Dyneto	6	Dyneto	6	Willard	90	6	1	S	GT	6	200
Chandler All	Single	Bosch	Hand	G & D	6	G & D	6	Prest-O-L	105	6	1	S	GT	6	
Chevrolet All	Single	Remy	Hand	A-L	6	A-L	6	Willard	80	6	1	GI	GT	6	
Cleveland 40	Single	G & D	Hand	G & D	6	G & D	6	Prest-O-L	94	6	1	S	GT	6	
Cole All	Single	Delco	H & A	Delco	6	Delco	6	Prest-O-L	50	6	1	S			
Columbia All	Single	At-Kent	Hand	A-L	6	A-L	6	Prest-O-L	80	6	1	S			
Comet C-53	Single	Wagner	Hand	Wagner	6	Wagner	6	Willard	75	6	1				
Crow-Elkhart L-55	Single	Conn	Hand	Dyneto	6	Dyneto	6	Exide	120	6	1		Cart	6	10
Cunningham V-3	Single	Delco	H. & A.	West	6	West	6	Willard	120	6	1				
Daniels 8-D	Single	Delco	H. & A.	Delco	6	Delco	6	Willard	140	6	1	S			
Davis 51	Single	Bosch	Hand	Delco	6	Delco	6	Willard	80	6	1	S			
Dixie Flyer	Single	Conn	Hand	Dyneto	6	Dyneto	6	Willard	6-80		2				
Dodge Brothers	Single	Own	H. & A.	N. E.	12	North East	12	Willard	50	12	1	GM	Encl	1-50	10
Dorris 6-80	Single	Bosch	Hand	West	6	West	6	Willard	115	6	1	S	GT	5-8	15
Dort 15	Single	Conn	Hand	West	6	West	6	U. S. L.	85	6	1	S		6	10
du Pont A	Single		H & A	West	6	West	6	Exide	115	6	1				
Elcar All	Single	Delco	Hand	Delco	6	Delco	6	Willard	90	6	1	S	GT	6-8	20
Elgin K	Single	Wagner	Hand	Wagner	6	Wagner	6	Willard	90	6	1		GT	6-8	20
Essex A	Single	Delco	H & A	Delco	7	Delco	6	Exide	105	6	1	S			
Ford T*	Single	Own	Hand	Own	6	Own		Opt	80	6	1	S			
Franklin 9-B	Single	At-Kent	Auto	Dyneto	12	Dyneto		Willard	60	12	2	GM	GT	14	10
Gardner G	Single	West	Hand	West	6	West	6	Willard	90	6	1	S	GT	6	20
Geronimo		Delco		Dyneto	6	Dyneto	6	Willard	88	6	1	S			
Grant H	Single	At-Kent	Hand	Bijur	6	Grant-W	6	Prest-O-L	105	6	1	S	2GT	6-8	15
Hanson 45-A	Single	Remy	Hand	A-L	6	A-L	6	Prest-O-L	80	6	1		Cart	6	3
Harroun	Single	Remy	Hand	Remy	6	Remy	6	Prest-O-L	80	6	1				
Harvard 4-20		At-Kent		Wagner	6	Wagner	6	Nat. Carb			1	S			
Hatfield A		Conn		Dyneto	6	Dyneto	6	Willard	100	6	1	GI			
Haynes All	Single	Opt	Hand	Leece-N	6	Leece-N	6	Willard	120	6	2	GI	GT	6	5
Hollier 206-B	Single	R. & B.	Hand	West	12	West	6	U. S. L.	80	6	1	S	GT	6	20
Holmes	Single	Eisemann	Auto	Dyneto	12			Willard	100	12	2	S	GT	15	15
Hudson Super-Six	Single	Delco	H & A	Delco	7	Delco	7	Exide	105	6	1	GM			
Huffman	Single	Conn	Hand	Dyneto	6	Dyneto	6	Willard	80	6	1	S		6	25
Hupmobile R	Single	At-Kent	Hand	West	6	West	6	Willard	87½	6	1	S	Encl	6	10
Jackson 6-38	Single	Remy	Hand	A-L	6	A-L	6	U. S. L.	94	6	1	GI	GT	6-8	15
Jones All	Single	Remy	Hand	A-L	6	A-L	6	Pre t-O-L	120	6	1	GI	GT	6	20
Jordan F	Single	Delco	Hand	Delco	6	Delco	6	Willard	108	6	1	S	C. B		
Jordan M	Single	Delco	Hand	Delco	6	Delco	6	Willard	94	6	1	S	C. B		
King 8	Single	At-Kent	Hand	West	6	West	6	Prest-O-L	120	6	1	S	Cart	6	10
Kissel	Single	Remy	Hand	Remy	6	Remy	6	Willard	117.5	6	1	S	3 A. G.	6	20
*Kline 6-55-J	Single	Conn	Hand	Wagner	6	Wagner	6	Prest-O-L	80	6	1	S	5 A. G.	6	
LaFayette	Double	Delco	H & A	Delco	6	Delco	6	Exide	120	6		GM		6	
Leach-Biltwell		Remy		West											
Lexington S-20	Single	Conn	Hand	G. & D.	6	G. & D.	6	Willard	100	6	1		GT	6	15-3
Liberty 10C	Single	Wagner	Hand	Wagner	6	Wagner	6	Willard	90	6	1	GI			
Locomobile 48-6-7	Dual	Berling	Hand	West	6	West	6	Exide	150	6	1	S	G. T.	6	10
Lorraine	Single	West	Hand	West	6	West	6	U. S. L.	94	6	1	S	GT		

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West*, Westinghouse; *Auto*, Automatic; *H & A*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L*, Ward-Leonard; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite, *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *West*, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE									SPARK PLUGS			Horn	Make and Model
Base Contact	Headlights Volts	Headlights CP.	Sidelights Volts	Sidelights CP.	Taillights Volts	Taillights CP.	Dashlight Volts	Dashlight CP.	Make	Diam. Inches	Thread Pitch		
Single	6-8	18	*6-8	5	6-8	2	6-8	2	Champion	7/8	18	Klaxon	Allen 43
Single	6-8	15	*6-8	5	3-4	2	3-4	2	Bethlehem	7/8	18	Sparton	American B
Single	6-8	21	6-8	4	6-8	4	6-8	4	A. C.	7/8	18	Klaxon	Anderson All
Double	6-8	18	*6-8	4	d6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Apperson All
Single	6-8	15	*6-8	4	6-8	2	6-8	2	Rajah	7/8	18	E. A.	Auburn 6-39
Single	6-8	21	6-8	4	3-4	2	3-4	2	Champion	7/8	18	Trojan	Beggs 19-T & 19R.
Single	6-8	21	*6-8	4	6-8	2	d6-8	2	Splitdorf	7/8	18	Klaxon	Biddle H.
Single	6-8	15	6-8	5	6-8	2	6-8	2	A. C.	7/8	18	E. A.	Bour-Davis 20
Single	12	36	12	4	6-8	2	d6-8	2	Herz-Boug	7/8	18	Klaxon	Brewster
Single	6-8	21			6-8	2	d6-8	2	Champion	7/8	18	Sparton	Briscoe 4-34
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Stewart	Buick
Single	7	18	8	6	4	2	4	2	Titan	7/8	18	Delco	Cadillac 59
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8		Klaxon	Cas V-20
Single	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Chalmers 35-C
Single	6-8	15			6-8	2	6-8	2	Champion	7/8	18	Garford	Champion KO
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Chandler All
Single	6-8	21	6-8	4	6-8	2	d6-8	4	A. C.	7/8	18	Klaxon	Chevrolet All
Single	6-8	17	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Cleveland 40
Single	6-8	21	*6-8	5	6-8	4	d6-8	5	A. C.	7/8	18	Sparton	Cole 870
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion	7/8	18	Schwarze	Columbia All
Single	6-8	18			6-8	2	6-8	4	Champion	7/8	18	Klaxon	Comet C-53
Single	6-8	15	6-8	4	6-8	2	6-8	2	Champion	7/8	18	E. A. Lab.	Crow-Elkhart L-55
Single	6-8	21	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Sparton	Cunningham V-3
Single	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Daniels 8-D
Single	6-8	21			6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Davis 51
Double	6-8	15			d3-4	2	d3-4	2	Champion	7/8	18	Garford	Dixie Flyer
Single	12-16	15			12-16	2	12-16	2	A. C.	7/8	18	Klaxon	Dodge Brothers
Single	6-8	21	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Klaxon	Dorris*
Single	6-8	15			6-8	2	d6-8	2	A. C.	7/8	18	Schwarze	Dort 15
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	du Pont A
Single	6-8	21	6-8	4	6-8	2	6-8	2	Champion	7/8	18	E. A. I.	Elcar All
Single	6-8	17			6-8	2	6-8	2	Champion	7/8	18	E. A. L.	Elgin K
Single	6-8	15			3-4	2	*3-4	2	A. C.	18 m.m.	1.5 m.m.	Sparton	Essex A
Double	6-8	17	6-8	2	6-8	2			Champion	1/2	pipe	Own	Ford T
Double	12-16	21	*12-16	4	6-8	2	6-8	2		7/8	18	Klaxon	Franklin 9-B
Single	6-8	15			6-8	2	6-8	2	Champion	7/8	18	Trojan	Gardner G
Single	6-8	21			6-8	2	6-8	2	Champion	7/8	18	Trojan	Geronimo
Single	6-8	15	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Trojan	Grant H
Single	6-8	15			6-8	2	6-8	2	Champion	7/8	18	Schwarze	Hanson 45-A
Single	6-8	15			3-4	2	d3-4	2	A. C.			Schwarze	Harroun
	6-8		3-4		3-4		*3-4			7/8	18		Harvard 4-20
Single	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.	7/8	18	Ecco	Hatfield A
Double	6-8	15	*6-8	12	d6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Haynes All
Single	6-8	15	6	4	3-4	2	3-4	2	A. C.	7/8	18	Sparton	Hollier 206-B
Double	12-16	30			6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon	Holmes
Single	6-8	15	6-8	4	3-4	2	*3-4	2	A. C.	7/8	18	Sparton	Hudson Super Six
													Huffman
Single	6-8	15	6-8	2	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Hupmobile R
Single	6-8	15	6-8	4	3-4	2	3-4	2	Champion	7/8	18	Stewart	Jackson 6-38
Double	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion	7/8	18	Newtone	Jones
Single	6-8	18	*6-8	4	6-8	3	6-8	3	A. C.	7/8	18	Sparton	Jordan F
Single	6-8	18	6-8	4	6-8	3	6-8	3	A. C.	7/8	18	Sparton	Jordan M
Single	6-8	15	*6-8	4	6-8	2	6-8	2	Champion	7/8	18	Sparton	King 8
Double	6-8	18			d6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Kissel
Single	6-8	15			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Kline 6-55-J
	6-8	21	6-8	6	3-4	4	3-4	2		7/8	18	Klaxon	Lafayette
													Leach-Biltwell
Single	6-8	21	6-8	4	6-8	2	d6-8	4	Bethlehem	7/8	18	E. A. L.	Lexington S-20
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	United	Liberty 10C
Single	6-8	21	6-8	6	6-8	4	6-8	2	Titan	7/8	18	Klaxon	Locomobile 48-67
Single	6-8	17			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Lorraine

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact. *1120 Model.

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Type of Electric System	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp.
Maibohm.....B	Single	At-Kent...	Hand...	Bijur.....	6	Bijur.....	6	Willard....	94	6	1	S.....	2-A.....	6	20
Marmon.....34	Single	Delco.....	Auto....	Delco.....	6	Delco.....	6	Willard....	162	6	1	GI....	Cart.....	.....	.....
Maxwell.....25	Single	At-Kent...	Hand...	Simms-Huff	12	Simms-Huff	12	Prest-O-L..	35	12	1	GM...	Cart....	12	20
McFarlan.....127	Double	Opt.....	Hand...	West.....	6	West.....	6	Willard....	.....	6	1	GI....	5 A. G..	6	.....
Mercer.....Ser. 5	Single	Berling....	Hand...	West.....	6	West.....	6	Willard....	90	6	1	S.....	Cart.....	.....	10
Meteor.....KR	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Metz, Master-Six.....	Single	Conn.....	Hand...	West.....	6	West.....	6	Willard....	120	6	1	.....	.....	.....	.....
Mitchell.....F-40	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	100	6	1	S.....	GT.....	6	10
Monitor.....	Single	Conn.....	Hand...	Dyneto...	6	Dyneto....	.....	Prest-O-L..	110	6	1	.....	.....	.....	.....
Monroe.....S-9	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	U. S. L....	80	6	1	.....	.....	.....	.....
Moon 6-48	Single	Wagner...	Auto....	Delco	6	Delco	6	Exide.....	120	6	1	S.....	.....	.....	.....
Moon.....6-6	Single	Delco.....	Auto....	Delco	6	Delco	6	Exide.....	120	6	1	S.....	.....	.....	.....
Moore.....F	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	Willard....	80	6	2	.....	.....	.....	.....
Nash.....	Single	Wagner...	H & A..	Delco.....	6	Wagner...	6	Willard....	100	6	1	S.....	.....	.....	.....
National....Series BB	Single	Delco.....	H & A..	West.....	6	West.....	6	Prest-O-L..	110	6	1	S.....	G. T....	6-8	5
Nelson.....D	Single	Bosch.....	Hand...	U. S. L....	12	U. S. L....	12	Willard....	72	12	2	S.....	G.....	12	5-30
Oakland.....34-B	Single	Remy.....	Hand...	Remy.....	6-8	Remy.....	6	Prest-O-L..	85	6-8	1	GI....	.....	.....	.....
Ogren.....6-60-T6	Single	Bosch	Hand...	West	6	West	6	Willard....	120	6	1	.....	Cart....	6	10
Oldsmobile.....37-A	Single	Remy.....	Hand...	Remy.....	6	Willard ...	6	Remy.....	80	6	1	.....	.....	.....	.....
Oldsmobile.....45-B	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	80	6	1	.....	.....	.....	.....
Olympian.....45	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	U. S. L....	.....	6	.....	.....	.....	.....	.....
Overland.....90	Single	Conn.....	Hand...	A-L.....	6-8	A-L.....	6	U. S. L....	75	6-8	.....	GI....	Glass....	6	20
Overland.....4	Single	Conn.....	Hand...	A-L.....	6-8	A-L.....	6	U. S. L....	75	6-8	1	GI....	Glass...	6	20
Packard.....3-35	Single	Delco.....	H & A..	Bijur.....	6	Bijur.....	6	Willard....	120	6	1	S.....	G. T....	6	10
Paige.....All	Single	At-Kent...	H & A..	G & D.....	6	G & D....	6	Willard....	108.4	6	1	S.....	G.....	.....	20
Pan-American.....All	Single	At-Kent...	Hand...	West.....	6	West.....	6	Willard....	100	6	1	S.....	G.....	6	.....
Paterson.....6-47	Dual	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	110	6	1	.....	.....	.....	.....
Peerless.....Ser. 6..	Single	At-Kent...	H & A..	A-L.....	6	A-L.....	6	Willard....	.....	6	1	.....	.....	.....	30
Piedmont.....4-30	Single	Delco.....	Hand...	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S.....	.....	.....	
Piedmont.....6-40	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	90	6	1	S.....	.....	.....	.....
Pierce-Arrow... 38&48	Double	Delco.....	H & A..	West.....	6-8	West.....	6	Willard....	150	6	1	S.....	5 A. G..	6-8	.....
Pilot.....6-45	Dual	Delco.....	Hand...	Delco.....	6	Delco.....	6	Prest-O-L..	80	6	1	GI....	.....	.....	.....
Porter.....46	Dual	Berling....	Hand...	West.....	12	West.....	12	Prest-O-L..	118	12	1	S.....	Cart....	12	15
Premier.....6-D	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	123.5	6	1	S.....	.....	.....	.....
Reo.....T & U	Single	North East	Hand...	North East	6	North East	6	Willard....	108.5	6	2	GI....	Wire....	6	5
Reo.....T6 & U6	Single	North East	Hand...	North East	6	North East	6	Willard....	108.5	6	1	S.....	Wire....	6	6
Revere.....	Single	Bosch.....	Hand...	West.....	6	West.....	6	Willard....	120	6	1	S.....	GT.....	6	15
Roamer.....6-54	Single	Bosch.....	Hand...	Bijur.....	6	Bijur.....	6	Columbia..	117	6	1	S.....	3A.....	6	10
R & V Knight..J & R	Dual	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	117	6	1	S.....	Cart....	250	20
Saxon.....125	Single	Remy.....	Hand...	Wagner...	6	Wagner...	6	Prest-O-L..	80	6	1	S.....	Cart....	6-8	15
Sayers.....C.P.	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	80	6	1	G1....	C.B.....	.....	.....
Scripps-Booth..... B	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Prest-O-L..	85	6	1	GI....	G. T....	6	20
Seneca.....H-2	Single	Conn.....	Hand...	Allis Chalm	6	Allis Chalm	.....	Prest-O-L..	88	6	1	GM..	.....	.....	20
Singer.....20	Single	Bosch.....	Hand...	West.....	6	West.....	6	Willard....	115	6	1	S.....	G. C....	.....	5& 10
Skelton.....35	.....	Conn.....	Hand...	West.....	6	West.....	6	Prest-O-L..	85	6	1	.....	.....	.....	.....
Spaeke.....S-20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard.....8-I	Double	Dixie....	Hand...	West.....	6	West.....	6	Willard....	160	6	1	S.W...	2-A.....	6	15
Stanley.....735	.....	.....	.....	Remy.....	6	.....	.....	Willard....	100	6	1	G....	Cart....	6	20
Stearns.....SKL-4	Single	At-Kent...	Hand...	West.....	12	West.....	12	Willard....	61.5	12	1	S.....	.....	.....	20
Stephens.....80	Single	Conn.....	Hand...	A. L.....	6	A-L.....	6	U. S. L....	116	6	1	S.....	Cart....	6	20
Studebaker.....All	Single	Wagner...	Hand...	Wagner...	6-8	Wagner...	6	Willard....	115	6-8	1	S.....	Cart....	6	10
Stutz.....H	Double	.....	Hand...	Remy.....	6	Remy.....	6	Willard....	.....	12	1	.....	.....	.....	.....
Templar.....445	Single	Simms....	Hand...	Bijur.....	6	Bijur.....	6	Columbia..	100	6	1	S.....	.....	6	20
Tulsa.....E-1,2,3	Single	Delco.....	Hand...	Dyneto ...	6	Dyneto....	6	Exide.....	90	6	1	S.....	G. T....	6	15
Velie.....48	Single	At-Kent...	S. A....	Bijur.....	6	Bijur.....	6	Willard....	120	6	1	S.....	Wire....	.....	15
Westcott..C-38&C-48	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Willard....	120	6	1	S.....	C. B....	.....	.....
Willys-Knight....88-4	Single	Conn.....	Hand...	A-L.....	6-8	A-L.....	6	U. S. L....	120	6	2	GI....	G. T....	6	15
Winton Six.....24	Single	Bosch.....	Hand...	Bijur.....	6	Bijur.....	6	Willard....	120	6	.....	S.....	G. T....	6	15
Winton Six.....25	Single	Bosch.....	Hand...	Bijur.....	6	Bijur.....	6	Willard....	139	6	1	S.....	C. B....	6	15
Winther.....61	Single	West.....	Hand...	West.....	6	West.....	6	Willard....	127	6	.....	S.....	G. I....	6	10
Wolverine.....	Single	Bosch.....	Hand...	Bijur.....	.....	Bijur.....	6	Prest-O-L..	120	6	1	S.....	C. B....	6	15

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West* Westinghouse; *Auto*, Automatic; *H. & A.*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L*, Ward-Leonard; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite, *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *West*, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE									SPARK PLUGS			Horn	Make and Model
Base Contact	Headlights Volts	Headlights CP.	Sidelights Volts	Sidelights CP.	Taillights Volts	Taillights CP.	Dashlight Volts	Dashlight CP.	Make	Diam. Inches	Thread Pitch		
Single	6-8	20	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Schwarze	Maibohm B
Single	6-8	30	*6-8	9	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Marmon 34
Double	12-16	15	*12-16	4	12-16	2	12-16	2	Champion	7/8	18	Schwarze	Maxwell 25
Single	6-8	21	*6-8	12	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	McFarlan 127
Single	6-8	21	6-8	5	6-8	5	6-8	4	Champion	7/8	18	Sparton	Mercer Ser. 5
													Meteor K, R
Single	6-8	16	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Trojan	Metz
Single	6-8	15			s6-8	2	6-8	2	A. C.	7/8	18	Sparton	Mitchell F-40
									Champion	7/8	18	Klaxon	Monitor
Double	6-8	16			6-8	2	6-8	2	Champion	7/8	18	Trojan	Monroe S-9
Single	6-8	20			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Moon 6-48
	6-8	20			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Moon 6-68
Single	6-8	20	6-8		6-8	2			Champion	7/8	18	Garford	Moore F
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Nash
	6-8	20	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	National Series BB
Double	12-16	15	12-16	4	12-16	2	12-16	2	Champion	7/8	18	Schwarze	Nelson D
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Oakland 34-B
Single	6	32	6		6	4	6	4	Champion	7/8	18	Klaxon	Ogren 6-60TC
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oldsmobile 37-A
Single	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oldsmobile 45-B
									Champion			E. A. Lab.	Olympian 45
Single	6-8	12			3-4	2	*3-4	2	Champion	1/2		Auto-Lite	Overland 90
Single	6-8	16			3-4	2	*3-4	2	Champion	1/2		A. L.	Overland 4
Single	6-8	33	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Packard 3-35
Single	6-8	17	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Paige All
Single	6-8	32			6-8	2	*3-4	4	Champion	7/8	18	E. A. Lab.	Pan-American All
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.			E. A. Lab.	Paterson 6-47
Single	6-8	15	6-8		6-8	2	6-8	4	A. C.			Sparton	Peerless Ser. 6
Single	6-8	12			6	2	6	2	Champion	7/8	18	Klaxon	Piedmont 4-30
Single	6-8	12			6	2	6	2	Champion	7/8	18	Klaxon	Piedmont 6-40
Single	6-8	20			6-8	5	6-8	5	A. C.	7/8	18	Klaxon	Pierce-Arrow 38&48
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Pilot 6-45
Single	12-16	20	12-16	4	12-16	4	12-16	2	Champion		18	Stewart	Porter 46
Double	6-8	21	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Premier 6-D
Double	6-8	15			3-4	2	*3-4	2	A. C.	7/8	18	Trojan	Reo T & U
Single	6-8	15			6	2	*3-4	2	A. C.	1/2		Klaxon	Reo T6 & U6
Single	6-8	20	*6-8	8	6-8	4	6-8	4	Rajah	7/8	18	Klaxon	Revere
Single	6-8	15	*6-8	2	6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Roamer 6-54
Single	6-8	15	6-8	4	6-8	2	d6-8	4	A. C.	7/8	18	Klaxon	R & V Knight J & R
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Trojan	Saxon 125
Single	6-8	15			6-8	2	d6-8	2	Champion	7/8	18	Stewart	Sayers C. P.
Single	6-8	18			6-8	2	6-8	2	A. C.	7/8	18	Trojan	Scripps-Booth B
Single	6-8	15	6-8	2	6-8	2	d6-8	2	A. C.	7/8	18	Fitzgerald	Seneca H-2
Single	6-8	15		4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Singer 20
	6	18			6	2	6	2	Bethlehem	7/8	18	E. A. Lab.	Skelton 35
													Spacke S-20
Double	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Standard 8-I
Double	6-8	21	6-8	4	6-8	2	6-8	2				Klaxon	Stanley 73
Single	12-16	21	*12-16	4	12-16	2	12-16	2	A. C.	7/8	18	B.&A.Lab.	Stearns SKL-5
Single	6-8	15	6-8	2	6-8	2	6-8	2	Champion	7/8	18	Trojan	Stephens 80
Single	6-8	12			6-8	2	6-8	2	Champion	1/2		Sparton	Studebaker All
Double	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.			Klaxon	Stutz H
Single	6-8	21	*6-8	4	6-8	2	6-8	2	Champion	7/8		Klaxon	Templar 445
Single	6-8	21	6-8	2	6-8	2	d6-8	2	Champion	7/8	18	Trojan	Tulsa E-1,2,3
Single	6-8	15	6-8	4	6-8	4	d6-8	4	Champion	7/8	18	Sparton	Velie 8
Single	6-8	18	*6-8	4	3-4	2	d3-4	2	A. C.	7/8	18	Klaxon	Westcott C-38&C-48
4 S-D2	6-8	21	6-8	4	3-4	2	*3-4	2	Champion	7/8	18	Klaxon	Willys-Knight 88-4
Single	6-8	17	6-8	7	6-8	2	6-8	2	Champion	7/8	18	American	Winton Six 24
Single	6-8	17	6-8	7	6-8	2	6-8	2	Champion	7/8	18	Electric	Winton Six 25
Single	6	18			6	4	6	2	A. C.	7/8	18	Klaxon	Winther 61
Single	6-8	32	6-8	7	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Wolverine

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact. *1120 Model.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Philadelphia	Phil. Automobile Trade Ass'n	Jan. 10 to 17
Willimantic, Conn.	State Armory	Jan. 16 to 18
Montreal	Motordrome, V. Leverque, Mgr.	Jan. 17 to 24
Hazelton, Pa.	Chamber of Commerce	January
Topeka, Kan.	Annual Automobile Show	January
Oakland, Cal.	Alameda Trade Ass'n	Jan. 19 to 26
Cleveland, O.	Cleveland Automobile Mfrs. & Dealers' Ass'n	Jan. 17 to 24
Hartford, Conn.	Hartford Automobile Dealers' Ass'n	Jan. 17 to 24
Schnectady, N. Y.	James J. Callahan, Manager	Jan. 19 to 24
Milwaukee, Wis.	Annual Show, B. J. Ruddle, Manager	Jan. 19 to 25
Spokane, Wash.	Spokane Dealers' Automotive Show	Jan. 21 to 25
Chicago	National Automobile Chamber of Commerce	Jan. 24 to 31
Chicago	Automobile Salon	Jan. 24 to 31
Amsterdam, N. Y.	New York State Armory	Jan. 26 to 31
Kansas City	Overland Bldg., E. E. Peake, Mgr.	Jan. 31 to Feb. 6
New Brunswick, N. J.	Annual Show, W. A. Kuehn, Mgr.	Jan. 31 to Feb. 7
Minneapolis, St. Paul	Minn. Automobile Trade Ass'n	Jan. 31 to Feb. 7
Bridgeport, Conn.	Eighth Annual Show	Feb. 2 to 7
Toledo, O.	Terminal Auditorium	Feb. 2 to 7
Rochester, N. Y.	Rochester Auto Trades Ass'n	Feb. 2 to 7
Baltimore, Md.	Automobile Show	Feb. 3 to 7
Wilmington, Del.	Hotel DuPont	Feb. 3 to 8
Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 4 to 7
Charlotte, N. C.	Charlotte Automobile Trade Ass'n	Feb. 9 to 14
Greenfield, Mass.	Mass. State Armory	Feb. 9 to 14
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 9 to 14
Nashville, Tenn.	Automobile Show	Feb. 9 to 14
Salt Lake City	Automobile Show	Feb. 9 to 14
Cedar Rapids, Iowa	Automobile Show	Feb. 9 to 14
Deadwood, S. C.	Deadwood Business Club	February
Brooklyn, N. Y.	Motor Vehicle Dealers' Ass'n	Feb. 14 to 21
Detroit, Mich.	Detroit Automobile Dealers' Ass'n	Feb. 14 to 21
Des Moines, Ia.	Herring Motor Co.	Feb. 16 to 21
St. Louis	St. Louis Automobile Mfrs. & Dealers' Ass'n	Feb. 15 to 20
Manchester, N. H.	Automobile Show, Academy	Feb. 16 to 20
San Francisco	San Francisco Motor Car Dealers' Ass'n	Feb. 21 to 28
Ottawa, Canada	Motor Show	Feb. 21 to 28
Bethlehem, Pa.	Sixth Annual Show, J. L. Ellicot, Mgr.	Feb. 23 to 28
Louisville, Ky.	Louisville Automobile Dealers' Ass'n	Feb. 23 to 28
Pittsfield, Mass.	Mass. State Armory	Feb. 23 to 28
St. Joseph, Mo.	St. Joseph Automobile Dealers' Ass'n	March 1 to 6
Portland, Ore.	Portland Automobile Trade Ass'n	Feb. 23 to 28
Grand Rapids, Mich.	Automobile Show	Feb. 23 to 28
Wichita, Kas.	Automobile Show	Feb. 23 to 30
Columbus, Ohio	Memorial Hall	Feb. 24 to 28
Newark, N. J.	First Regiment Armory, C. E. Holgate, Mgr.	Feb. 28 to Mar. 6
Buffalo, N. Y.	Buffalo Automobile Dealers' Ass'n	March 1 to 6
Portland, Maine	Portland Automobile Dealers' Ass'n	March 1 to 6
Perth Amboy, N. J.	First Automobile Show	March 1 to 6
Springfield, Mass.	Springfield Automotive Dealers' Ass'n	March 1 to 7
Lyons	Automobile Show	March 1 to 8
Syracuse, N. Y.	Syracuse Automobile Dealers' Ass'n	March 1 to 6
Seattle, Wash.	Seattle Automobile Show	March 1 to 6
Denver	Denver Automobile Trade Ass'n	March 2 to 6
Clinton, Iowa	Clinton Automobile Dealers' Ass'n	March 3 to 6
Lancaster, Pa.	Automobile Show	March 3 to 6
Indianapolis, Ind.	Automobile Show	March 8 to 13
Jersey City, N. J.	Automobile Show	March
Boston, Mass.	Mechanics' Bldg., C. D. Campbell, Mgr.	March 13 to 20
New Orleans	Automobile Show	March
Little Rock, Ark.	Annual Show, Liberty Hall	March 15
Oklahoma City, Okla.	Oklahoma City Dealers' Ass'n	March 15
Wilkes-Barre, Pa.	Passenger Car & Truck Show	March 15 to 22

TRUCK SHOWS

Philadelphia	Commercial Museum	Jan. 17 to 24
Chicago	National Automobile Chamber of Commerce	Jan. 24 to 31
Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 9 to 10
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 16 to 21

TRACTOR SHOWS

Wichita, Kan.	Wichita Thresher-Tractor Club	Feb. 9 to 14
Kansas City, Mo.	Kansas City Tractor Club	Feb. 16 to 21

MISCELLANEOUS CONVENTIONS AND MEETINGS

Chicago	Highway Transport Conference	Jan. 24
Chicago	N. A. D. A.	Jan. 26 to 27
Atlanta, Georgia	Automobile Dealers' Ass'n Convention	Jan. 27
Chicago	National Ass'n of Automobile Show Managers	Jan. 27
Chicago	Society of Automotive Engineers	Jan. 28
Louisville, Ky.	Seventeenth Annual Convention American Road Builders' Ass'n; Tenth American Good Roads Congress and Eleventh National Good Roads Show	Feb. 9 to 13
Lake Charles, La.	Louisiana-Mississippi Automotive Trade Ass'n Convention	March 17 to 18

California Registration Figures—California motorists have already paid $4,383,536 for licenses. The following data is obtained from the figures for 1919 to date: 453,765 automobiles, 31,647 chauffeurs, and 2,917 automobile dealers.

High Cost of Flying—The high cost of flying is well evidenced by the recent Syracuse-Rochester aerial derby which was held the first part of this month. Although the Rochester Aero Club came close to profit-airing in charging $1 a pound for aerial express service to Syracuse, air traffic experts now report that a dollar was not enough. It is rumored that if Rochester shippers check up their aerial bills of lading too carefully before sending their checks it is going to cost real money to be a member of the board of directors of the aero club.

According to figures available it cost the club $300 to fly two planes to Syracuse and back. As only a small amount of shipments were carried in one machine and but one package in the other certain individuals are wondering how they are going to ante up the deficit.

Many Motor Law Violators—The new bureau of law enforcement of the motor division, State Highway Department, has turned up 5,000 violators of the motor code in Pennsylvania in less than two months. Most of the violations are divided among nine counties. Prosecutions in some instances have begun. "The majority of the violations have been for operating without regard to the speed limit, or the rights of the road, for using only one tag, or none at all and for disregard of the motor truck regulations," says John H. Glass, head of the bureau, who has five assistants.

New Theft Law in Michigan—Automobile thieves will find themselves up against a new law which bids fair to be greatly effective in curbing thefts throughout Michigan. The statute requires automobile dealers and garage owners to make duplicate records, in ink, of all cars sold, purchased or exchanged, specifying the date, the name of the purchaser or vendor, and the make, serial number, motor number and a minute description of the vehicle. Copies must be forwarded to the secretary of state the first day of each month, the state department furnishing blanks for the purpose. First reports are due Feb. 1.

Many Truck Lines in Ohio—A survey of the motor truck transportation routes out of Columbus shows a good development in that mode of transportation in recent months. In all there are eight regular motor truck lines out of the Buckeye capital, radiating in as many directions. Lines are run to the Sunbury, for dairy farmers, to Johnston for the same purpost. to Dayton, to Newark, to Mt. Vernon and to Marion. In addition several of the Columbus truck concerns run trucks in special trips as far as Pittsburgh to the east and St. Louis to the west, covering Michigan, Indiana, Illinois and other neighboring states. These runs are mostly for household goods.